FUNDAMENTALS OF CHILD STUDY

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FUNDAMENTALS OF CHILD STUDY

A DISCUSSION OF INSTINCTS AND OTHER FACTORS IN HUMAN DEVELOPMENT WITH PRACTICAL APPLICATIONS

BY

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AUTHOR OF "INDUCTIVE PSYCHOLOGY"

NEW EDITION, REVISED

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TO MY LAMENTED FRIEND

LOUIS H. GALBREATH

WHOSE GENEROUS AND GENIAL PERSONALITY HAS GLADDENED
AND ENNOBLED MANY LIVES, AND WHOSE BROAD VIEWS,
STIMULATING PRESENCE, AND SUGGESTIVE CONVER-
SATIONS HAVE OFTEN INSPIRED AND DIRECTED
MY THOUGHT AND WORK AS AN INDIVIDUAL
AND AN EDUCATOR, THIS BOOK IS
AFFECTIONATELY DEDICATED

sities, with varying preparation and amount of time to devote to the subject. Many parents will prefer to begin with chapter five and to omit chapter fourteen and perhaps some of the chapters that follow.

Acknowledgments are due to many earnest students of children, especially to G. Stanley Hall, the father of all child study in America; to J. Mark Baldwin, who has given us a theory of organic development; to Lloyd Morgan, who has described instincts and habits with such acuteness and clearness; and to Earl Barnes, who has so intelligently studied the effects of social influences upon children; also to Mr. J. F. Reigart and to my wife for assisting with the proofs, and to my friend Rev. W. F. Greenman for suggestions.

E. A. K.

FITCHBURG NORMAL SCHOOL,
July, 1903.

PREFACE TO THE SECOND EDITION

The very kind reception given the first edition of this book by instructors in normal schools and universities, and by parents and teachers in this and other countries, has been very gratifying to the author, who had scarcely dared hope that he could make the book so acceptable to so many different classes of persons.

This new edition has given the opportunity to correct a number of errors in the references at the close of each chapter, to add the names of a few new books to the list at the beginning, and also to improve a few sentences and paragraphs.

It has not been thought best to make any radical revision at the present time. This will probably be done a few years later. In the meantime, the author will be glad to receive suggestions from those who have used the book regarding corrections, omissions, or additions that it is thought would increase its usefulness.

E. A. K.

Fitchburg Normal School,
May, 1907.

PREFACE TO THE THIRD EDITION

In the thirteen years since this book was first printed great progress has been made in the details of the sciences related to the development and training of children but its general outlines and principles have not been greatly modified. The advice of many persons who have used the book as a text in colleges and normal schools or as a guide to study clubs has been sought and kindly given. The author has profited greatly by the suggestions he has received and he here publicly extends thanks to all who have made suggestions. He could not follow all of them without greatly enlarging the book or making it into one of several special purpose books. Judging from the steadily increasing use made of the former edition by study clubs and general readers as well as by students in universities, colleges, and normal schools it seemed best to retain the characteristics of a moderate sized general purpose book.

One of the most important changes made is in additions to the bibliography. Many of the older references are, however, retained as often being more intelligible to beginning students than the more technically scientific discussions of recent times. The other most important addition is a chapter on Modifications of Native Endowments which shows in more detail than formerly the principles governing learning processes. In connection with this change the chapter on Heredity is enlarged and transposed and several topics in other chapters are omitted. The chapters on Abnormalities and on Classification of Instincts have been omitted, though much of their material will be found elsewhere, while chapter seven has been divided.

A few persons may be disappointed that more of the many tables obtained from recent investigations are not quoted as definite indications of truths and as standards of comparison. The author, however, feels that the quantitive results thus far obtained are still as a rule only partial and tentative. Moreover, they are likely to be misleading if not accompanied by details of method, the giving of which, space does not permit. References are given to such investigations and all students should, if possible, make a study of one or more of them. It is hoped that the plan of the new edition will continue to be acceptable to the classes of persons who have hitherto found the book useful.

E. A. K.

Nov. 1916.

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CHILD STUDY LITERATURE[1]

Books Relating to the First Three Years of Childhood

DEARBORN: Moto-sensory Development.
FITZ: Problems of Babyhood.
MAJOR: First Steps in Mental Growth.
MOORE: Mental Development of a Child.
PREYER: Mind of the Child, vols. I and II.
Infant Mind; condensed from above.

Books Containing Sympathetic Observations and Practical Suggestions

ABBOTT: On the Training of Parents.
BERLE: The School in the Home.
BIRNEY: Childhood.
BRUCE: Psychology and Parenthood.
CABOT: Ethics for Children.
CHENERY: As the Twig is Bent.
DAVIDS: Notebook of an Adopted Mother.
DU BOIS: Beckoning of Little Hands.
The Point of Contact.
Fireside Child Study.
EWALD: My Little Boy.
FISHER: Self Help.
A Montessori Mother.
FORBUSH: A Guide Board to Childhood; it contains annotated bibliography.
GILMAN: Concerning Children.
GRUENBERG: Your Child To-day and To-morrow.
HARRISON: Misunderstood Children.
HILLYER: Child Training.
HOGAN: A Study of a Child.

[1] At close of the book will be found a more complete bibliography, reference to which is made at the close of each chapter.

HUTCHINSON: We and Our Children.
KIRKPATRICK: The Use of Money.
MALLESON: Early Training of Children.
MANGOLD: Problems of Child Welfare.
McKEEVER: Training the Boy.
PROUDFOOT: Mothers' Ideals.
SPILLER: The Training of the Child.
STABLETON: The Diary of a Western Schoolmaster.
ST. JOHN: Stories and Moral Education.
STONER: Natural Education.
URWICK: The Child's Mind, Its Growth and Training.
WIGGIN: Children's Rights.
WILTSE: The Place of the Story in Early Education.
WINTERBURN: From a Child's Standpoint.
Nursery Ethics.
WOOD-ALLEN: The Mother in Education.
Making the Best of Children.

Autobiographical and Literary Accounts of Children

ALDRICH: Story of a Bad Boy.
BURNETT: The One I Knew Best of All.
CANTON: W. V., Her Book and Various Verses.
HOWELLS: A Boy's Town.
KELLER: Story of my Life.
LAUGHLIN: Johnnie.
LOTI: Romance of a Child.
MARTIN: Emmy Lou.
MEYNELL: The Children.
PHILLIPS: Just about a Boy.
SMITH: Evolution of Dodd.
All the Children of All the People.
WARNER: Being a Boy.
WHITE: Court of Boyville.

Scientific but not Severely Technical Books

ADLER: Moral Training of Children.
BARNES: Studies in Education.
BOLTON: Principles of Education.

CHAMBERLAIN: The Child.
DAWSON: The Right of the Child to be Well Born.
DRUMMOND: Introduction to Child Study.
The Child, His Nature and His Nurture.
GESELL: The Normal Child and Primary Education.
GODDARD: The Kallikak Family.
HALL: Aspects of Child Life and Education.
JOHNSON: Education by Plays and Games.
JUDD: Genetic Psychology for Teachers.
KING: The Psychology of Child Development.
The High School Age.
KIRKPATRICK: The Individual in the Making.
LEE: Play.
OPPENHEIM: Development of the Child.
Mental Growth and Control.
O'SHEA: Social Development and Education.
PARTRIDGE: An Outline of Individual Study.
Genetic Philosophy; An Epitome of the Publications of G. S. Hall.
ROWE: The Physical Nature of the Child.
SALEEBY: Parenthood and Race Culture.
ST. JOHN: Child Nature and Nurture.
SWIFT: Mind in the Making.
Youth and the Race.
Learning and Doing.
SULLY: Psychology of Childhood.
TANNER: The Child.
TRACY: The Psychology of Childhood.
WARNER: The Nervous System of the Child.

Journals

I. Pedagogical Seminary. Worcester, Mass. Is devoted chiefly to genetic phases of child physiology and psychology.

II. Journal of Educational Psychology. Baltimore, Md. Is devoted chiefly to experimental studies of children and of psychological and pedagogical tests.

III. Psychological Clinic. Philadelphia, Pa. Is devoted chiefly to reports of studies of exceptional children.

FUNDAMENTALS OF CHILD STUDY

CHAPTER I

NATURE, SCOPE, AND PROBLEMS OF CHILD STUDY

DIFFERENCE BETWEEN CHILDREN AND ADULTS

PHYSICALLY and mentally, children differ from adults in other ways besides the obvious ones of size and knowledge. Physically this is evident from the fact that we can form some idea of the age of a person represented in a picture or statue when there is nothing to show the scale upon which it was made. There must therefore be peculiarities of form and proportion of parts at different ages upon which we base our judgments. Most persons, however, who have not had their attention called to the matter are unable to state in just what ways children and adults differ. Some even hesitate regarding the most obvious differences in relative size of head, body, and limbs, though the ratios are approximately as follows: —

Height of head of adult to that of an infant	2:1
Length of body of adult to that of an infant	3:1
Length of arm of adult to that of an infant	4:1
Length of leg of adult to that of an infant	5:1

These differences in proportion of parts are probably greater than exist between some adult animals and adult human beings. They are only the more obvious of the many differences between children and adults, in proportion of parts, size of vital organs, and physiological processes such as those of circulation, respiration, and digestion.

Mentally, every one recognizes marked differences between the mind of a child and of an adult, as is indicated by the expressions "childlike" and "childish." When questioned as to the exact character of these differences, most persons are even more hazy and indefinite in their answers than they are regarding bodily differences. Those who have given the subject most attention, however, are sure that the mental differences are greater than the physical, though they are less easily stated in exact terms.

ORIGIN OF CHILD STUDY

This has led to the attempt to determine definitely and accurately the peculiarities of childhood at various stages, and thus we have the beginning of a new science — that of Child Psychology, Paidology, or Child Study. If children were merely adults in miniature, there would be no occasion for such a science; but as we have seen, they differ radically from adults, hence a science of child study has arisen, which is, in many respects, quite distinct from the general sciences of physiology and psychology. Such a study is necessary to the completion of the circle of the sciences, and it is also indispensable as a basis for the science of education and in efficient child welfare work of all kinds.

The theory of evolution also has directed attention to the development of children as well as to changes in plants and animals as they pass from the embryo to maturity. This, with the growing interest in education and in all that pertains to child welfare, has stimulated the study of the physical and mental characteristics of children. Children have therefore become a distinct center of interest.

PERIOD COVERED BY CHILD STUDY

It is not easy to say when a boy or girl becomes a man or woman. Even in law there is variability; for a man is recog-

nized as earlier mature or competent for certain purposes than he is for others; *e.g.* he can enter the army at eighteen and vote at twenty-one, but cannot hold the office of President till he is thirty-five. Again, the law recognizes the passing of the normal adult stage by providing for the retirement of officers after a certain age. Old age, as well as the period before maturity is reached, may therefore furnish a separate field for study.

Child study is properly concerned with all the changes that usually take place in human beings before they reach maturity. Most of these changes occur before the age of twenty, but some may not appear until ten or fifteen years later.

Roughly speaking, infancy and childhood last about a dozen years, adolescence or the transition period about the same, vigorous maturity about three dozen, and old age or decadence, one dozen. Some powers mature and fail earlier and others later than at these periods. There are also great individual differences as to the age at which maturity is achieved, and at which decadence begins.

SIGNIFICANCE OF INFANCY

A fish has relatively little infancy; its form is from the first nearly that of the adult; it can do almost everything the adult fish can do, and it is possible to teach it comparatively little. A robin is helpless at birth, yet practically mature at two months. A chicken does not need to learn to walk and take food. It becomes independent in a few weeks and completely mature in less than a year, though retaining considerable capacity for learning. The child is helpless for months, dependent for years, immature at least a score of years, and capable of learning for three score. In general, the animals that are most helpless in infancy have the longest period of immaturity, and keep longest their plasticity or power of learning, are most complex, most capable of variety of sensation and movement, and most in-

telligent. In other words, the longer the infancy of any species of animals, the greater its ultimate power and intelligence. This is true as a broad generalization, but of course there are many exceptions.

ADVANTAGES OF A LONG INFANCY

Looking upon an animal organism as a machine, the lower animals are more perfect at birth than the higher. They are like a complex "nickel-in-the-slot" machine, which responds in an appropriate way not only to one, but to several kinds of stimuli. The fish has an almost unchanging environment and needs to do only a few things in order to secure food and avoid enemies; hence, its mechanism from the first prepares it for most of the exigencies of life, and it need not and can not learn much. It is sent out of nature's factory nearly ready to do the limited business of life necessary for its own preservation. Higher animals come into a much more complex environment, each phase of which requires a different response; hence infinite complexity of structure is necessary for them to transact their life business successfully.

Moreover, the environment varies according to the place in which the young animal is born, the season of the year, and its own movements; hence, it is nearly as impossible to prepare a higher animal by its original structure for a successful life as it would be to prepare a machine that would, from a single adjustment, perform with accuracy and despatch all the functions of a clerk (including the answering of customers' questions).

A machine may be constructed that will do part of the work of a clerk, but not all, for new situations arise which cannot be provided for by any fixed mechanism. This is especially true when he changes from one department to another, or one kind of business to another, or adopts new and improved methods. In a similar way the higher animals, in order to do their life work

and live, must have the power of adjusting themselves to the environment into which they are born, and of adapting themselves to changes in that environment. To do the first, they must be incomplete at birth and capable of being modified by experience till they fit their environment; and to do the second they must retain something of their plasticity or capacity for being modified, so that if the environment changes they can again make the necessary adjustment to the new situations.

Infancy is, therefore, the period during which the more complex organisms are perfected by further internal development and by activities which prepare them to react appropriately to the various phases of their environment. In other words, it is the period for developing the native powers of the individual and for learning how to live in the environment in which he finds himself.

HUMAN INFANCY AND PLASTICITY

Man is the most complex of animals and also the most capable of preserving himself in diverse climates and conditions of life; hence it is not surprising to learn that he is born with the greatest capacity for being modified to suit his environment. He is less mature, has fewer fixed modes of reaction to stimuli than other animals, and the period of his immaturity lasts from five to a hundred times as long as in others of the higher animals. Clearly, therefore, infancy is of vast significance in a human being, and a man's characteristics at various ages are more largely due to modifications produced by his own and less to race experiences than is the case with any other animal. Man has more instincts than any other animal, but his instincts are all subject to greater modification by experience. Plasticity is not only greater in man, but greatest in early life. The more fundamental physical characteristics of a man are fixed at twenty-five, and the mental

at thirty-five; yet plasticity in minor details is retained till the period of decadence.

Not only is the period of infancy longer in man than in animals, but it is longer in civilized than in savage people, and is constantly becoming longer. As life becomes more complex, more special training is needed before a young man is prepared to make a living for himself. The age of entering upon business and professional life is therefore from five to ten years later than it was fifty years ago.

Not only is the period of preparation for living extended, but there is more need for the preservation of plasticity in every individual as long as possible; for the environment is constantly changing with the invention of new machinery and methods, and advancement in knowledge and social relations. Men who have not sufficient plasticity to adapt themselves to these changes quickly fail in the struggle for existence. The function of education in a progressive nation is therefore not merely to develop habits suited to present conditions of life, but also to preserve plasticity and if possible develop adaptability that will enable the individual to fit himself to new conditions as they appear.

In the evolution of the race a long period of infancy has been of great significance. The helplessness of children kept parents together, and thus family life, which is the basis of all social life, had its beginning. Moreover, the task of caring for and training children gives an education that could be achieved in no other way, and contact with such enigmatic and variable creatures renews the youth of adults and helps them to preserve their plasticity. Not only does man's superiority to animals depend largely upon his longer infancy, or, in other words, upon his greater plasticity, but the position of each nation as a civilized power and of each individual in society is also largely determined by ability to respond to new situations in new ways.

INNER AND OUTER FACTORS IN DEVELOPMENT

We never know the nature of a material object until we bring it in contact with other substances and with new forces. In a similar way, we do not know the nature of a child until we have observed his actions under various conditions. Not only do we not know what the child is until we have observed his actions under various circumstances, but he actually acquires new characteristics in the presence of each new person and in the performance of each new action.

What a child is, therefore, at any given time, is developed from what he was at the beginning, and what he has acquired by his reactions. What he may be is potentially present at first, and can become actual only after certain phases of his nature have been developed by experience. A grain of corn has the potential power of producing other grains of corn, but it cannot actually do so until it has been subjected to heat and moisture, and has developed leaves, stalk, tassel, and silk. In a similar way the child has various potential powers that cannot become actual until environment has developed certain others. No conceivable environment can make corn develop characteristics of the oak, or make it produce grain before it produces leaves. So the child must become a human being, and must develop in a certain way; each instinct, just as truly as the beard, has a definite time for development.

Since, however, man is the most plastic of all beings, the order of his development is subject to great modification. This is especially true of his mind. Unlike other machines, the brain is always in process of construction, always being modified and never completed. A machine may be used for threshing oats for several years, then it can be used with equal success for threshing wheat; but a brain used in the botanical classification of plants must be changed by practice before it is correspond-

ingly useful in the grammatical classification of words. Every time the mind does a thing it becomes in some respects a different mind; hence the factors of nature and nurture are almost inextricably mingled in psychical development, and this makes the natural order of development exceedingly difficult to determine.

The question is often asked whether certain characteristics are native or acquired. The answer might be in nearly every case, "They are both." Native powers may lie dormant unless awakened and stimulated to activity by environment. On the other hand, nothing wholly foreign to one's nature can be acquired and made a permanent part of one's self. The relation of outer and inner factors in development is well illustrated by experiments on the optic nerve. Some kittens were kept blindfolded so the optic nerves were not acted upon by light, while the eyes of others of the same litter were opened and thus early subjected to the influence of light. At varying intervals the kittens were killed and their optic nerves examined. It was found that those which were kept blinded acquired their medullary sheaths without the stimulus of light, but much less quickly than the others. In this case the inner tendency was finally effective, even when the outer stimulus was cut off. In many other cases, however, where the inner tendency is less strong, outer influences are probably necessary in order that the inner possibility may become an actuality. All acquisitions, therefore, have for their roots inner tendencies, and all inner tendencies remain undeveloped or develop slowly without the action of favorable outer influences.

THE PROBLEM TO BE SOLVED

To study the outer and inner factors in human development, and to determine how the inner factors are modified by the outer, is the work of child study. It must discover the natural

order of physical and mental development and the modifying effect of various conditions and activities at different stages. It must find what characteristics are, or tend to be, the most prominent at each age by determining the time of emergence and greatest prominence of each of the numerous instincts.

In order to eliminate the influence of environment, the test of generality must be applied and care must be taken that the instincts given form and intensity by special conditions are not confused with more fundamental or normal instinctive tendencies. For example, if all the children of about four years, in a village by the seashore, play at making and sailing boats, the inference may be drawn that there is a natural tendency to engage in those occupations at that age. Further observations show that in other localities the play occupations of the children are in all cases characteristic of the neighborhood. Everywhere children of four years imitate, but what they imitate varies with their surroundings; hence the correct generalization is that the tendency to imitate is strong at four years, because of inner laws of development, but that the particular form of imitation is determined by surroundings.

In every phase of child study the problem is similar. In each case we ask what inner tendencies are prominent at each age, and how these tendencies are developed and modified by outer influences. Child study is, therefore, concerned with all the characteristics that are present at birth in so far as they differ from those of adults, and with the general laws of development, according to which changes in size, structure, and instincts take place between early infancy and complete maturity.

The science of child study reveals the laws governing the more important changes with age in the course of the child's development and helps in understanding the more variable changes that appear from day to day.

The art of successful management of children must be founded

consciously or unconsciously on the science of child study. So great are individual differences at birth and so patent are the effects of environment that each child's peculiarities and history must be studied in order to rightly direct him. To show how such studies may be successfully made is another phase of the problems to be solved.

GENERALITY OF INNER FORCES OF DEVELOPMENT

The inner forces which determine the form, structure, and actions of each individual and the changes he shall undergo in reaching the adult stage are of three degrees of generality: (1) those determining what is characteristic of all members of the species; (2) those determining what is common only in a certain family or group of families; and (3) those producing the distinctive peculiarities of the individual. The first are the result of the whole history of the species and its ancestors in certain environment or environments; the second, of a portion only of the species and in a more limited environment; while the third are the result of the union of slightly unlike parents and of influences acting upon the individual organism during the embryonic period. Bismarck had the common characteristics of all human beings; he had also the characteristics prominent in Germans, and the individual peculiarities that made him Bismarck, rather than any other German.

The science of child study is chiefly concerned with the characteristic tendencies manifested by all children; yet it throws light on the more special characteristics of heredity in nations and families, and emphasizes the importance of individual characteristics. The educator needs to know what is usually true of children at each age in order that he may find the activity best suited to that age. The teacher, however, needs to be familiar not only with the characteristics common to most children of the age she has in charge, but also with their national

and individual peculiarities. She must also make herself familiar with the environing influences past and present.

Exercises for Students

1. State physical differences between children and adults that you have noted or are able to discover.
2. State mental differences between children at different ages.
3. Mention various standards of maturity for men and women recognized by society as fitting them for certain purposes.
4. Tell what you have observed regarding the young of animals as to their relative helplessness, and the length of their infancy.
5. Mention instances where men have succeeded because of plasticity where others failed. Is plasticity needed more or less in children than in animals? Why?
6. Give illustrations of children showing different characteristics in new surroundings and to different persons.
7. Can you tell what characteristics are common at a certain age by studying children of one locality and nationality only? Why? Illustrate.

Suggestions for Reading

On physical differences between children and adults, see Oppenheim, chaps. ii and iii.

On the new science of child study, see Hall, *Forum*, Vol. XVI, pp. 429–441; Chrisman, *Forum*, Vol. XVI, pp. 728–736; *Ed. Rev.*, Vol. XV, pp. 269–284; O'Shea, *Jr. Ped.*, Vol. XI, pp. 9–23, and Scripture, *Ed. Rev.*, Vol. VIII, pp. 236–239.

On old age, see Scott, *Am. Jr. Psych.*, Vol. VIII, pp. 67–122.

On the stages of development, see Chamberlain, chap. iv, and Sanford, *Am. Jr. Psych.*, Vol. XIII, pp. 426–449.

On infancy of animals, Mills, *Animal Intelligence*, Part III, and Spaulding, *Pop. Sci. Mo.*, Vol. LXI, pp. 126–141 (reprinted); Thorndike, *Psych. Rev.*, Vol. VI, pp. 282–291.

On meaning of infancy, see Fiske, *Excursions of an Evolutionist*, chap. xii; *Destiny of Man*, chaps. iv and vi; Butler, *Ed. Rev.*, Vol. XIII, pp. 58–75, or *Meaning of Education*, pp. 3–34; Christopher, *Trans. Ill. Ch. S. Soc.*, Vol. II, No. 2, pp. 109–114; Chamberlain, chap. 1; Pycroft, *Pop. Sci. Mo.*, Vol. LXII, pp. 108–116.

On instincts and education, see Balliet, *Am. Physical Ed. Rev.*, Vol. VIII, pp. 1–7.

Later References

Books

Bolton	King (1)[1]	Tanner
Drummond	Gesell	Tracy

Articles

Howard, Frank E. Psychological Differences between Children and Adults. Ped. Sem., 1913, Vol. XX, pp. 236–253.

[1] The numbers refer to the titles listed in the Bibliography, p. 359.

CHAPTER II

LESS GENERAL NATIVE ENDOWMENTS OR HEREDITY

HEREDITY is the term applied in biology to the production of like by like. The fact that the offspring of plants and animals always belong to the same species as their parents, is named if not explained by the word "heredity." When the term is used by stock breeders and students of man, however, it has a more restricted meaning. It then refers not merely to the likeness in species, but to the less-marked characteristics which distinguish different breeds or families of the same species. A negro's child is not merely a human being, but he is a human being of the black type. A Bach is, as a rule, not merely a human being, a Caucasian, and a German, but also a Bach in the sense of being a musical genius.

The context will usually show whether the term "heredity" is used in the narrower or the broader sense. In both senses, the laws and the fundamental phenomena are the same. A minute cell formed by the union of a cell from a male with the cell of a female of the same species, develops into a being similar to its ancestors, both near and remote, and yet not exactly like any one of them.

We must not regard all native characteristics of the individual as hereditary. Offspring of the same parents differ from each other, partly because of heredity and partly from other causes. In all mammals there is a long period of development after two germ cells have united to form the embryo of a new individual, before birth takes place. During this time the body of the

mother constitutes the immediate environment and source of nourishment of the offspring. Individual peculiarities at birth may be due in part to modifications caused by the condition of the mother. In so far as this may be the case, heredity would not be identical with native characteristics of the individual. Again, characteristics of ancestors which were not perceptibly present at birth in an individual, may be clearly evident in the youth or in the mature man and may therefore be properly described as hereditary, providing there is no way in which they could have been acquired by the individual from the environment or by imitation.

There is considerable popular belief in the potency of "maternal impressions." It is undoubtedly true that a severe shock to the mother, especially if it occurs from four to six months before the birth of the child, may have serious results. Deformities thus produced are the result of arrest or disturbance of development and do not have any relation to the specific cause of the nervous shock to the mother. The popular supposition that if the mother is frightened by a hog, the child will resemble a pig, or if by a snake, will have the marks of a snake, has no support in scientific fact. There is no nervous connection between the mother and the fetus, hence the blood is the chief avenue of influence. Recent experiments of Dr. Cannon show that the character of the blood changes distinctly when the emotions of fear and anger are experienced; hence it is reasonable to suppose that a pleasant, normal emotional life for the mother is favorable to the best development of the child, but it is not likely that "maternal impressions" can go so far as to produce *specific* tastes or talents. Since the mother is the environment of the child during fetal life her condition has some influence upon its development. Such characteristics as may be increased or decreased by the specific character of this environment during pregnancy are not, properly speaking, hereditary

although they are congenital. The same is true of the effects of alcohol and venereal disease. A study of similar and dissimilar twins and of brothers and sisters who are not twins brings to light some of the interesting and complex relations between germ heredity, congenital and individual characteristics, and the influences of environment.

GENERAL TRUTHS OR LAWS OF HEREDITY

(1) *Children usually resemble their parents.* A child is, however, never exactly like either the father or the mother, nor does he possess the sum of all the characteristics of both or an equal fusion, but surely some of each. The prominent qualities of one parent or the other, rather than a fusion of those of both, frequently appear in the child. For this reason we find black-haired and red-haired children in the same family, instead of all with hair of an intermediate color. The child usually has also characteristics not possessed by either of his parents. The resemblance to a grandparent or even a more remote ancestor, or to a relative not in the direct line of descent, as uncle or cousin, may be more marked than to the parents.

(2) This suggests the truth that *inheritance is not simply from parents, but from the two lines of ancestry of the two families.* This view is supported by the fact that stock breeders cannot predict the characteristics of the offspring of mongrels or mixed breeds, while they can of those known to have been of pure blood for many generations. Going back a generation at a time one finds the number of ancestors increasing geometrically as follows: 2, 4, 8, 16, 32, etc., so that in the tenth generation there are a thousand ancestors. This shows why, when there are various breeds or families represented, it is impossible to predict the result of the union. On the other hand, when the ancestors are all from one line, the results can be predicted with some accuracy. So far as the facts are known it appears that the offspring of

two parents of different lines of pure breed will, other things being equal, most resemble the one that has been kept pure the greatest number of generations.

In the human race there is far less pureness of breed than in animals. A practically pure breed of animals pairing every year, can be established in five or six years; while to establish a pure breed of human beings, even if a regular plan were followed as is done with domestic animals, would require a century and a half. Again, since human beings move about much more than other animals, the people of any given locality are, as a rule, of much less pure blood than the various species of animals in the same region. Migration, wars, and intermarriage have resulted in the mixing of blood from almost all portions of the globe. The results of heredity in human beings are, therefore, under ordinary conditions, infinitely more difficult to predict than in animals; yet color may be predicted with a good deal of certainty in the offspring of black and white races.

(3) *Heredity is often of a general capacity rather than of a specific ability.* For example, the son of a great scientist may become a great writer or attain great success in business or politics. Moreover, nervous irregularity in the parents may appear in the children in the form of imbecility, insanity, or criminality.

(4) Where there is close *inbreeding*, it has been thought that weakness, especially mental, is likely to appear, and some of the royal families that have intermarried and degenerated are cited as evidence. Recent writers, however, are inclined to think that where weakness results from inbreeding, it is because weakness already exists and is merely increased by the process, while strong qualities are just as surely perpetuated and increased. The Jews have not developed mental weakness, though history shows no other such instance of human inbreeding carried on for thousands of years.

(5) *The offspring of parents of pure blood sometimes show characteristics of the remote ancestors of the breed;* this is known as *atavism* or *reversion.* For example, pigeons like the original blue-rock pigeons from which all are descended, are occasionally found among the offspring of fancy strains which ordinarily breed true. Reversion is more likely to occur when distinct breeds are crossed. For example, mules, which result from crossing the horse and the ass, often have stripes similar to those of their zebra-like common ancestor.

(6) *Not all hereditary qualities are apparent at birth.* There is good reason to believe that they appear at various stages of development, as do instincts, especially at the time of puberty. Physical features and mental and moral qualities of father or mother, hitherto unnoticed, often become conspicuous at this time. It is also claimed that inherited bodily or mental disease frequently appears at about the same age in certain families.

GENERAL THEORY OF HEREDITY

The germ cells that unite to form the human embryo are of almost microscopic minuteness. The embryo of man can at first scarcely be distinguished from the embryo of a rat or an elephant, yet it has potentially all the characteristics of the species man. Moreover, it has the peculiarities of the race, nation, and family of each of the two parents from whom the germ cells came. How such minute portions of matter can embody all the characteristics of their ancestors and impose these characteristics upon all the nutriment by which their size is increased many million fold, is one of the greatest marvels of nature and life. Anything that will make this marvel definitely conceivable is therefore to be welcomed.

If we accept the results of recent experiments showing the exceeding smallness of particles of matter, we may think of each characteristic of each tissue (such as bony or nervous) and of

each organ as represented by different kinds of particles of matter in the germ cells. It is thus possible to conceive of the way in which the characteristics of the parents may be transmitted to their descendants. This gives a very crude theory, however, which is not supported by observation and experiment. If every tissue and organ must contribute material to the germ cell, we should expect that the child of a man who had lost a leg or an arm would lack the same member, but such is not the case. Again, if the different parts of an embryo are formed of different kinds of particles, we should expect that if an embryo were divided a complete organism could not develop from one of the parts. It has been found, however, by experiments upon frogs and other of the lower animals, that the fourth of the embryo (for example, of a frog) will, under favorable conditions, develop into a whole animal with no part missing.

Slight changes in conditions, such as turning an embryo over, putting it in a new medium, subjecting it to a different temperature, or supplying it with food differing in kind or amount from the normal, greatly modify its development. It is, therefore, improbable that the characteristics of each animal and each organ are determined by fundamentally different elementary particles of which the germ cells are composed. It is more reasonable to suppose that there are comparatively few varieties of particles, and that these tend to combine in certain ways for each species, according to preëstablished affinities, attractions, and repulsions which are modified in a greater or less degree by external surroundings of the embryo, and by the relative vigor of the different elements of the two germ cells composing it.

The chief discussions in biology during the last decade have centred about the possibility of modifying germ cells through modifications of body cells. Changes in food, exercise, and mode of life may make great changes in an animal or person; but whether such changes modify the germ cells also, so that de-

scendants will have the new characteristics, is a disputed point. For example, if a son is born to a man at twenty-five, and after the father has spent twenty years in practice to develop his musical talents, another son is born, will the last son inherit any more musical ability than the first one? Weismann, who has been the leader on one side of this controversy, says that no changes which take place in the life of a parent can modify the germ cells so as to affect the offspring. Each parent transmits to his offspring what he inherits, but not what he acquires.

If this be true, culture cannot be directly transmitted; each new generation must begin where the old began, and if it advances beyond the former, it must be because of better advantages for learning rather than because of inherited ability. According to this view, acquired weakness of body or mind is also non-transmissible.

In the biological world, progress is possible according to this theory because no two individual descendants are exactly alike, and because the members of each new generation that are best suited to survive under certain constant conditions, are the ones that live and produce descendants, while the others die or produce few offspring. This process being repeated generation after generation, all offspring finally come to have the favorable characteristics in a marked degree. For example, of a dozen young partridges, the ones that are colored most nearly like their surroundings are likely to survive and produce descendants with similar coloring. Again, the most favorably colored of these survive and produce, and thus after many generations the principle of natural selection results in complete color adaptation to surroundings. When a breeder of fancy pigeons continues to breed only those having certain coloring, the results are similar, only in this case it is human instead of natural selection that determines the type of pigeon that shall survive.

Instincts and *intelligence* are modified in a similar way. For

instance, only those young partridges that have in the greatest degree the tendency to remain quiet when danger threatens, are likely to reach maturity and produce offspring. Natural selection, therefore, has thus determined the instinct as well as the coloring of the partridge. In the case of *intelligence*, the results are much the same. Plasticity or ability to learn is unquestionably favorable to survival; hence the young animals that learn most readily are likely to survive and produce descendants, some of which have the capacity in a greater degree. These in turn survive, and thus may natural selection alone account for the development of intelligence in the higher animals and in man. To them ability to learn in infancy is more advantageous than to know unchangeably many favorable modes of reaction. Thus ability to learn, which is the essence of intelligence, is developed.

This question of inheritance of acquired characteristics is not yet settled in biology, but it is now generally admitted that the characteristics that a parent transmits are chiefly those that he inherited, and that the characteristics acquired by the parent rarely, if ever, so affect the germ cells as to be transmitted to his descendants. In the case of human beings if there is any transmission of acquired characteristics by germ inheritance, it is probably in so slight a degree as to have no effect worthy of note, unless it be where many generations have made the same acquisitions. Progress in civilization is therefore not to be looked for in greater inherited skill or intelligence.

MENDELISM

The whole theory of heredity and the methods of studying it have been modified by the experiments and generalizations of a man named Mendel who began experimenting with garden peas a half century ago. His results were obscurely published and only brought into prominence at the beginning of this century

when two other scientists arrived at similar conclusions through their investigations. Since then, the laws that he formulated have been tested by numerous experiments upon plants and animals and by records of heredity in animals and in human beings. The results of these investigations and of the microscopic study of the development changes occuring in germ cells are in general confirmatory of Mendel's laws or formulated generalizations. He has undoubtedly furnished the key by the use of which many though perhaps not all the facts of heredity may be understood.

In the original experiments performed by Mendel, round and wrinkled peas were crossed and the seed from the cross planted and allowed to be self-fertilized. The resulting crop consisted of approximately one fourth round peas which when planted and self-fertilized produced round peas only, one fourth wrinkled peas which when planted and self-fertilized gave a pure strain of wrinkled peas, while the remaining seeds were of a mixed character, producing when self-fertilized, three varieties of peas, round, wrinkled, and mixed, and in the same proportions as before. Similar results have been found for a great variety of crosses of plants and animals, and in so far as a unit character can be distinguished, this law of heredity seems to be general. Its action may be shown by symbols representing unit characters as follows. Let *A* represent one unit character or determiner of the characteristic, *e.g.*, roundness of peas; and B another, *e.g.*, wrinkledness; then the union of cells resulting from a cross between the two will be A and B determiners, plus A and B determiners, and it is evident that if A combines with A, the resulting individual pea will be of the pure round variety. Similarly, if B unites with B, a pure wrinkled pea will result. Again, if the A of one variety combines with B of the other and the B of the first with the A of the second there will be two individuals of mixed character. It is evident then that when a mixed variety

fertilizes itself that the chances are that one fourth of the A's will combine with A's, one fourth of the B's with B's, and one half of the A's with B's.

This very simple law is often obscured by the principle of dominance of one characteristic and the recessiveness of the other. For example, a cross between a pure black and a pure white mouse results in black mice only, but one fourth of the descendants of these black mice of mixed heredity are white. Evidently B uniting with B can give only black progeny, while when B unites with W, since B is dominant, black is also the result; but when W and W determiners meet, as they will according to chance in one fourth of the cases, white progeny will be produced. In a similar way light-haired or red-haired children may be born to parents who are both dark in complexion, providing both parents have in their ancestry a person with light or red hair as the case may be. If one parent is of parents wholly dark in complexion and the other of mixed heredity or of light only, there will be no children of light complexion because darkness is dominant. There may, however, be degrees of darkness if one is dark and the other mixed, according as the units or determiners from the dark parent unite with the black or the white determiners of the parent cells of mixed ancestry.

The cases just named are comparatively simple because blackness and whiteness are positive and negative characteristics, whiteness being due merely to the absence of pigment. Where both characteristics are positive, there may be both characteristics in the progeny equally or in varying degrees of dominance, or there may apparently sometimes be some sort of fusion or modification of the two unit characters giving a progeny differing from either.

Usually when there are several unit characters each follows the fundamental law of the single pairs. If round yellow peas are crossed with wrinkled green peas, several varieties of peas

may result, such as round green peas or wrinkled yellow ones; but the relative proportions of round peas will be the same as if all the peas were of the same color, while the proportion of yellow peas will be the same as if the crosses were of the same shape.

There is still doubt as to what characteristics are really transmissible as unit characters and as to the possible modifying effects of certain determiners upon others. Again there is reason to believe that in the changes taking place when the characteristics of two reproductive cells rearrange themselves in forming the new germ or embryonic cell, the various unit characters are not combined individually with other unit characters, but a group of unit characters combines with another group of unit characters. It may sometimes be difficult or impossible to isolate certain characters from others, such for example as bitterness and hardness in fruit, so as to get a hardy variety satisfactory to the taste.

There are other phenomena of heredity upon which Mendelism throws little light, although not inconsistent with them. One of these is sex linked inheritance such as the inheritance of color blindness by a son from a mother who was not color blind but was the daughter of a man who was color blind, or the inheritance of egg productiveness from a cock whose mother had that characteristic while her daughters fail to show it.

It will be seen that many of the earlier generalizations regarding heredity, based on experience, may now be explained very easily by Mendelism; and although all the problems are not yet solved, a flood of light has been thrown upon the subject.

EUGENICS

Recently there has been much discussion of the possibility of improving the human race through the application of the known truths of heredity to the mating of human beings. The move-

ment was advocated by Sir Francis Galton and the term "eugenics" coined by him. At first thought it seems strange that man, who has done so much to develop useful varieties of plants and animals from those that were relatively valueless, should not have exercised the same intelligence in improving his own race.

The difficulties, however, for positive eugenics are almost infinitely greater than in the case of improving plants and animals. There are only from three to five generations in a century, hence much time is required to bring about changes in man by breeding. Again, the number of characteristics from which selections are to be made for improvement are much greater in man than in plants and animals.

These facts would make the process a long and difficult one even if nothing stood in the way. There are other difficulties, however. No intelligent breeding is possible without a definite idea of what is desired. The man who wants breeds of beef, cattle, and draft horses proceeds in an entirely different way from the man who wants trotting horses and milch cows. Who can agree upon the characteristics and combination of characteristics that should be produced in the improved variety of human beings? Should they all be of one variety or would it be better to have as many varieties of men as there are special talents? If these questions were settled, are we sure that any one could mate men and women more wisely than they would select for themselves if uninfluenced by social, financial, and other artificial reasons? But aside from these considerations, the final practical reason why systematic positive improvement of the human race is not possible is that human beings cannot be controlled and made to mate as some one else deems fitting.

The chances of success in the case of *negative* eugenics are, however, much greater. The breeding of the admittedly unfit may be checked with the result that the general average of the human race may be raised through a diminution of the number of

unfit and inferior individuals born. The need for this form of eugenics is much greater than formerly because the lives of more of the physically and mentally unfit are preserved and because there is less limitation of the birth rate on the part of inferior classes of people than among the superior; *e.g.*, college graduates are not producing enough children to preserve their number, while feeble-minded persons are as a rule prolific beyond the average. The principal things suggesting encouragement are as follows: (1) Those who want children do not so frequently limit the number of their offspring if they can in any way care for them adequately; (2) normality is in general dominant over abnormality. The offspring of a feeble-minded parent and a normal parent may all be normal in appearance, but half of them will be carriers of feeble-mindedness. If all mate with normal persons, only one fourth will carry the strain and so on until the number carrying it is almost negligible. Unfortunately this does not usually happen, for the feeble-minded more often mate with defectives and produce many offspring.

These truths are most strikingly shown in the Kalikak family, where the descendants of the same man by a feeble-minded woman were nearly all of inferior mentality, while his descendants by a normal woman were of a superior type.

The most significant fact of heredity for purposes of eugenics is closely associated with the above. If two carriers of feeble-mindedness or other abnormality, though not actually deficient themselves, mate, some of the offspring are likely to be abnormal. This is the chief principle which, in our present knowledge, must guide in practical eugenics. Persons who have the same type of abnormality should not marry, although a person with an abnormality may often safely marry one whose ancestry is entirely free from that defect. Some abnormalities appear to be related, for example, feeble-mindedness, alcoholism, sex perversion, and tuberculosis. Indeed, it is not improbable that, in

general, most forms of abnormality or weakness are related so that there is risk in the mating of two individuals who are not of sound stock even though their weakness is not the same. In the present state of knowledge, however, we are only justified in saying that those having the same deficiency in their ancestry should not marry, and that where the defects have been shown to be related, the same rule should apply.

In the case of some defective classes, especially the feeble-minded, it is evident that they will not control themselves, hence society must take the matter in hand. Laws prohibiting their marriage are not sufficient, for they propagate without marriage. Sterilization laws are not well enforced and their value is questioned. Custodial care is a sure remedy to which there is little objection except that of cost. This may be met in part by employing in useful labor a large proportion of the number confined. About two thirds of the cases of feeble-mindedness are hereditary, and one generation of complete custodial care would probably reduce this class of feeble-mindedness by one half.

The prevention of other forms of inferior births by force is less easy, partly because we do not know so well who should be prevented from procreation and partly because we feel less justification for interference with the liberty of the individual. Some forms of insanity are known to be inheritable while in other cases there is much uncertainty. It is impossible to tell whether certain unions are more likely to result in the production of an inferior individual or of a genius who may be worth more to society than many commonplace normal persons. In the case of criminals who are not otherwise deficient our present knowledge gives little or no ground for action. In the case of blindness and deafness we know that if the same defect is hereditary in both lines of ancestry some of the children will almost surely be defective. There is little reason to suppose, however, that

the union of a congenitally blind person (such cases are rare anyway) with a congenitally deaf person (of these there are many) would be any more likely to result in defects than if either mated with normal persons.

There are causes for the production of the unfit which are not strictly hereditary, the chief of which are venereal diseases and alcoholism. The first produces defects through germ infection of the embryo, and the latter through the devitalizing effects of the drug upon the germ cells of the parents. Regarding the first, there is no dispute; while in the case of the latter the facts as to the probable degree of injury are not known.

Laws restricting marriage and requiring medical examination previous to the issuing of a marriage license may be helpful, but they can only be made effective through an enlightened public opinion; hence, in the last analysis the cause of eugenics is best furthered by educational means. Not only is education needed, but also more knowledge; hence, there should be laws regarding marriage and birth records which would result in the accumulation of a vast number of reliable facts from which might be deduced more accurate laws of human heredity making possible more intelligent eugenic action.

SOCIAL HEREDITY

The acceptance in whole, or even in part, of Weismann's theory of heredity seems at first to make the problem of the improvement of the human race an almost hopeless one, since each generation gets no direct benefit from the improvement of the preceding generation, but must begin just where it did. A closer study, however, shows that the chances for racial improvement are just as good on the basis of this theory as on that of any other. *Capacity* for education, rather than increased knowledge and power at birth, is what human beings need in order that they may advance; and natural selection will amply provide for this,

especially in these days of rapid change in the conditions and activities of life.

The other factor most needed for racial advancement is a more *favorable environment* — greater intellectual and social treasures — which may be appropriated by the new generations without the toilsome digging required by their predecessors. Each new generation inherits, not only the wealth and knowledge of the race, but all the means of wealth and knowledge, such as machinery, industrial and commercial organizations, educational and scientific institutions, systems and methods, together with more or less fixed social ideals, customs, and language. Whether a man inherits the minute structural changes produced in his parents' bodies by what they did before his conception, is a matter of little moment compared with his inheritance of capacity and opportunity for using all the accumulated results of the experience of the ages. It is this inherited environment in which he is to grow, and upon which he is to feed, that chiefly determines the amount and direction of his development. All the conditions of life produced by civilization constitute what, in a very general way, may be called "social inheritance." Man is truly "the heir of all the ages," and each generation utilizes what has been produced and learned by the preceding. The social heritage of an individual consists of all the knowledge, beliefs, customs, laws, and language of the nation, community, and family into which he is born.

Much of what has been ascribed to physical heredity is, in reality, due partially or wholly to social heredity. The history of the Jukes family, in which it is shown that nearly all of more than a thousand descendants of one man were criminals or paupers, proves nothing regarding physical heredity, for the family was for many years almost isolated from society; consequently, the factor of social heredity had the fullest chance to operate. The children of a young couple belonging to this family

who moved into another locality, and thus partially got the benefit of a different social inheritance, grew up much as other children of the neighborhood. The records of charitable societies show that about eighty-five per cent of the children of paupers and criminals who are placed in good homes at an early age become good citizens.

Every nation and every family possesses a wealth of beliefs, sentiments, artistic and moral ideals, lore, traditions, and customs which descend to the children by an incontestible law of entail. Truly, in educating a child, we should begin with his grandparents; for he will inevitably get the benefit through social heredity in the form of family customs, habits, and traditions, though probably not through inherited acquisitions.

Improvement in the human race may be brought about first by making a better home and community environment which will give the best opportunity and stimulus for the development of desirable qualities, and second by improving the methods of instruction so that the children shall be able to take swift and complete possession of their valuable inheritance in material, social, and intellectual lines and use it efficiently. From the individual standpoint heredity should neither be ignored as of no importance nor yielded to as inevitably fixing one's destiny. Instinctive and hereditary tendencies are the roots from which the physical, mental, and moral life develops. Some individuals may develop more readily, and to a greater degree than others, all or some human characteristics, but each may make the most of his environment. Some cannot go as far as others in certain directions nor as easily, but no one has exhausted his possibilities of development. The practical problem is to expend our efforts upon the useful characteristics which we possess in the greatest degree.

Exercises for Students

1. Give examples of heredity in both the broader and the narrower meaning of the word.

2. Illustrate each of the laws of heredity.

3. Indicate how such characteristics as those of pointer dogs, trotting horses, homing pigeons, could have developed either with or without the inheritance of acquired characteristics.

4. Give several illustrations of Mendelian inheritance known to you.

5. Look up the statistics of the birth rate among different classes of people and point out their bearing upon eugenics.

6. Imagine a company of people of a civilized country placed on an island without tools or machines of any kind, and think how long it would take them to be able to live as they had been living. Then imagine a company of children of civilized people left without a language or any social or intellectual knowledge, as well as without the material conveniences of civilization, and think how long it would take them and their descendants to reach the civilization of their parents.

7. Are the peculiarities of half-breeds and others who are without a country or people of their own, due chiefly to physical or to social heredity?

8. What is the effect of never being a member of a family, as in the case of children in orphan asylums? Why?

Suggestions for Reading

On the general theory of heredity, see Orr, *Theory of Development and Inheritance*; Brooks, *Heredity*, also *The Foundations of Zoology;* Weismann, *The Germ-Plasm;* Romanes, *An Examination of Weismannism*, also *Darwin and After Darwin*, Vol. II.

For facts regarding heredity and environment, consult Ribot, *Heredity;* Nisbet, *Marriage and Heredity;* works on criminals, especially Morrison, *Juvenile Offenders;* Winship or Dugdale on *The Jukes;* Galton, *Hereditary Genius;* Woods, "Mental and Moral Heredity in Royalty," *Pop. Sci. Mo.*, Vol. LXI, pp. 366–378, 449–460, 506–513, Vol. LXII, pp. 76–84, 167–182; Ellis, *Pop. Sci. Mo.*, Vol. LVIII, pp. 595–603, Vol. LIX, pp. 59–67; Oppenheim, *Development of the Child*, chap. iv; and for a good brief discussion of theory and facts, see Eigenmann, *Pop. Sci. Mo.*, Vol. LXI, pp. 32–44.

On heredity and education, see Guyau, *Education and Heredity;* Bradford, *Heredity and Christian Problems.*

On social heredity, see Baldwin, Vol. II, especially pp. 57–64; Allen, *N. W. Mo.*, Vol. IX, pp. 400–403, 436–439; *Ed. Rev.*, Vol. XVIII, pp. 344–352; Monro, *Ed. Rev.*, Vol. XVI, pp. 367–377.
See also Wilson, *The Cell in Development and Inheritance.*

Later References

Books

Bolton	Ellis, Havelock (1) [1]	Sandiford
Conklin	Goddard (1 & 2)	Thomas
Conn	Hirsch	Thompson
Castle	Jewett	Thorndike (4 & 8)
Davenport	Jordan	Walter
Danielson	Nisbet	Winship
Dugdale	Pearson	Woods
Elderton	Saleeby	

[1] The numbers refer to titles listed in the Bibliography, p. 359.

CHAPTER III

PHYSICAL GROWTH AND DEVELOPMENT

GENERAL PHENOMENA OF GROWTH

If we were introduced into a factory where little machines were taking into and making part of themselves, wood, iron, and other manufacturing materials, and thus gradually becoming large machines, each of its own kind (*e.g.* locomotives or sewing machines), and that without interfering with the movement of a cog, crank, or wheel during the enlargement, we should be astonished beyond measure. Yet this is analogous to what organic machines (plants and animals) are doing in nature's factory all around us. Milk, grass, and grain are transformed into horses, cows, chickens, and children, with the proper characteristics of each; and all the time bones, muscles, and blood vessels are enlarging without a pause in the working of the organism. Only familiarity prevents us from continually wondering at this miracle, repeated in a thousand different forms each year.

Every organism begins as a single cell, and by taking in and transforming nourishment, it grows into an individual of its species. All increase in size is the result of two processes: (1) increase in number of cells by division, and (2) enlargement of the cells thus formed. Growth during the embryonic period is due mainly to the first cause, and after birth, to the second. The body of a child is composed of about as many cells as that of an adult; hence his growth is principally by the enlargement of cells.

The importance of inner tendencies is well illustrated in physical growth and development. The law of motion, that a body once set in motion continues to move forever and at the same rate, unless acted upon by some other force, does not apply to growth. An organism does not grow forever when once started, nor is the rate of growth uniform, but it grows at a varying rate, till the size of its species is attained, then it stops. It is not even possible to change, except within narrow limits, the rate, amount, or direction of growth, by changes in food and surroundings. Evidently each species is so organized that it grows about so much during a certain time, and lives about so long. That size is determined largely by the number of elements in the germ cell is indicated by recent experiments upon the embryos of lower animals. It has been found, for example, that if the embryo of a frog is divided into two or four parts, each part will develop into a whole frog, but of a correspondingly fractional size and length of life.

GENERAL TRUTHS REGARDING GROWTH OF CHILDREN

The most rapid growth is before birth, for the infant at birth is five million times as large as the original germ cell. After birth the most rapid growth is during the first year, when it is nearly threefold. From this time on increase in size is less rapid, and in general the rate slightly decreases till about the eleventh year, when there is an acceleration in growth, first in height, then in weight. The acceleration in growth begins earlier in girls, but lasts longer in boys. In both, the stage of rapid growth at puberty is preceded and followed by a period of slow growth, and again in both, rapid growth in height precedes rapid growth in weight. Since girls begin growing rapidly while boys are in the stage of slow growth, girls are for a year or two taller and heavier than boys. The age at which this occurs in girls is about twelve years, but varies a year or two in

different countries. Growth is usually complete before twenty, at least as regards height.

Measurements of individual children show that in general a period of rapid growth in height or in length of limb is a period of slow growth in diameter, and, conversely, rapid growth in diameter occurs at the time of retarded growth in length.

The absolute height and weight of healthy children may vary greatly, but the relation of weight to height is more nearly the same for children of varying size who are of the same age. The coefficient of growth found by dividing weight by height varies from .95 at five and a half years of age to 1.90 at seventeen years. In other words a boy of five weighs less than one pound for each inch of height, while one of seventeen weighs nearly two pounds for each inch of height. The normality of a child's growth is better indicated by his weight-height coefficient than by any absolute figures. The coefficient for tall children is, however, a little in advance of that for short children of the same age, which indicates that they mature earlier.

Since lung power or breathing capacity is such an important factor in all physiological processes, it is not surprising to find that there is a definite relation for each age between height and lung capacity or breathing power. At five and a half years of age the cubic inches of breathing capacity divided by the linear inches of height give a vital-height coefficient of 1.16, while at seventeen it has increased to 3.50. (See curves and tables in the Baldwin cards reproduced in Chapter XVIII.)

The relation of growth coefficients to maturity seems to be very close. A child who has high coefficients of weight-height and breathing power-height is likely to be more mature physiologically than the one whose growth and vital coefficients are low. Children who become pubescent at an early age are likely to have high coefficients, while those who are late in maturing usually have low coefficients.

There is reason to believe also that mental maturity corresponds more closely with physiological age than it does with chronological age. Children who rank high in the coefficients of growth and vitality are therefore likely to be more mature mentally than those who rank low, although they are not necessarily brighter than the smaller and less mature children. The relations of breathing power and weight are probably most significant of all ratios as to health and mental development. According to De Busk the coefficient of breathing capacity to weight correlates closely with the results of the Binet tests as to mental age.

FACTORS DETERMINING GROWTH

The truths regarding growth stated in the preceding topic apply not merely to the people of one race, or to those with the same habits of exercise and eating, but to all peoples from which statistics have been obtained; hence these variations in growth common to all of the human species must be due to inner tendencies. So definite are these tendencies that of all human beings living under the most varied conditions there are very few who fail to reach a height of five feet and still fewer that greatly exceed six feet.

Heredity is another less universal inner tendency determining growth, as is shown by the fact that people of certain nations and of certain families mature earlier or attain a greater size than those of others. There are also tendencies to certain accelerations of growth which are peculiar to *individuals*, for not all children, even of the same family, grow at the same rate at the same age. Neither do they all attain the same size when outer influences are the same. The amount and rate of growth of every child is thus largely determined by inner tendencies.

Outer influences, however, such as climate, exercise, and nutrition may modify rate and amount of growth.

Climate, especially temperature, may be a factor in growth, since seasonal variations may be detected in the growth of children. Increase in the height of children is greatest in the spring and early summer, while increase in weight is greatest in the fall or early winter. This may be interpreted either as the ~~result of an inner~~ tendency to rhythmic seasonal growth, or to the effects of variation in temperature. People in warm countries mature more quickly, but do not reach a greater size, than those in cold countries; hence, we may infer that heat does not increase the ultimate size of human beings. People of the Arctics and the Tropics are as a rule not large; hence, a temperate climate is probably more favorable to the greatest growth.

Exercise may modify amount and rate of growth to some extent, but its greatest effect is ~~probably~~ in the substitution of muscular for fatty tissue in certain parts, without much change in ulti~~mate size~~. The fact recently noted that children engaged in manual training during the summer showed less than the usual variation in growth, with change of season, suggests that seasonal variations in growth may be due to change in occupation as much as to change in temperature.

The fact that children of the well-to-do, and presumably better fed, classes are larger than those of the less favored class, seems to indicate that *nutrition* is another important factor in growth. ~~In~~ England this might be partially explained by heredity, but not in this country. The fact, however, that the rate of growth of children in both this country and in England is less in the well-to-do classes during school life from the ages of six to eighteen than it is in the poorer classes, shows that the effects of good or poor nutrition must be chiefly limited to the period preceding the school age. It is altogether probable that poor nutrition has the greatest effect during the embryonic period and the first year or two of life when growth is rapid; hence, though both infants and adults of the poorer classes are

smaller than those of the more favored classes, yet the amount of growth from six to eighteen is greater in the former than in the latter.

That growth is greatly affected by a combination of factors dependent upon housing conditions is strikingly shown by statistics of the height of children tabulated according to the number of persons per room.

A temporary condition such as *sickness* nearly always retards growth; but if recovery is complete, there is usually a period of rapid growth in which the loss is made up; hence, though the time of growth may thus be modified, the total growth is probably affected only by prolonged illness or other unfavorable conditions.

GROWTH OF PARTS

The facts previously mentioned as to the difference in the relative size of parts in children and adults are only some of the most striking instances of the general truth, *each part increases in size according to an inner law of its own.* Other facts equally striking are as follows: the brain increases in weight about four times, the heart thirteen times, and the lungs twenty times. The weight of the brain of boys at birth is 12.29 per cent of that of the body, while at twenty-five it is only 2.16 per cent of the weight of the body. The changes of other organs are: heart, from .76 per cent to .46 per cent; right lung, .94 per cent to .77 per cent; liver, 4.6 per cent to 2.8 per cent; and kidneys, .75 per cent to .46 per cent. The shape of the organs also changes with age. For example, the Eustachian tube is not only relatively short in the child, but it is absolutely broader than in the adult; while the child's stomach is much more tubular in form and more nearly vertical in position than the adult's.

The law governing the growth of each part must, however, be consistent with the general law governing the growth of the body as a whole, otherwise the proportion of parts would vary

to such an extent that organic processes would be disturbed, and life and health could not be maintained. Presumably it is advantageous for the proportion of parts to vary somewhat at different ages, when there are different functions to be performed and when the physiological processes of respiration, circulation, and digestion are undergoing change.

It is now known that growth is regulated to a considerable extent by the action of cert in glands, notably the thyroid. Deficiency in size and mentality is frequently associated with deficiency in this organ.

HEALTH AND GROWTH

Normal growth during childhood is in general a sign of good health, while very rapid or very slow growth is usually a sign of poor health. The period of rapid growth at the beginning of puberty is generally regarded as a critical period both physically and mentally.

There is difference of opinion, however, as to the relation of growth to health at this time. It is held by some that health is likely to be interfered with by this rapid growth. This may be true in individual cases; but the investigations of Hertel and others show that there is less illness among boys and girls during the period of rapid growth than in the years of slow growth immediately preceding and following. To this it is replied that though there is not actual disease, there is usually some debility that with a little overstrain may result in illness; hence, requirements, especially in school, should be lessened at this time in order that all the energy may be expended in growth. The facts, however, do not support this view, for most youths are more energetic and restless at this than at any other time (though some individuals are sluggish and listless). Experiments also prove that at this time there is a great increase of muscular power and in size of vital organs, especially the lungs. The

argument that ill health often dates from this period is answered by the fact that recovery also often takes place at this time through what is called "outgrowing the disease."

There is no ground, therefore, for the view that in general either physical or mental work should be discarded during this period, though such is undoubtedly advisable in individual cases. Moderately rapid growth is always an accompaniment of health and vigor. The only difference is that at this time growth is normally more rapid than at other times. Abnormally rapid growth is likely to be accompanied at this, as at other ages, by poor health and imperfect development. Temporary weakness may result at this time from inequality in growth and development, as when a child grows rapidly in height without a corresponding increase of lung capacity. The development of new functions at this age complicates the situation. Although at this time a youth can often do more work and endure more hardships than at any other time, yet if the difficulties are not overcome, the results are more serious than at any other time, especially when there is lack of harmony in the development of parts. The rapid growth of this period calls not for less work but rather for more, yet care must be exercised that there be no overstrain. At this time is needed not stimulation or repression, but direction, in order that development may correspond to growth and be of a desirable kind.

GROWTH AND DEVELOPMENT

These two terms are often used interchangeably, probably because the processes usually take place together. Their meaning is, however, different, and there is often a lack of correlation between the processes.

Growth, properly speaking, refers only to increase in size of parts, and the consequent change in size and shape of the body as a whole. It is the result of increase in the number or size

(or both) of the cells composing the body. *Development* more properly denotes changes in character and connection of cells. If an infant were to grow to adult size without any corresponding change in cells, he would be utterly incapable of sustaining his weight, with his cartilaginous bones and flabby muscles not yet connected with controlling nerve centers. It is a fact well known to physicians that deficient or improper nutritive conditions often affect development more than they do growth. A child may be quite large for his age, but poorly developed because of lack of mineral matter in the bone cells, just as a plant in a dark cellar may attain great size but be utterly lacking in the essential qualities of a healthy plant.

Arrest or acceleration of growth and development together is probably less serious than of either alone. Where they take place together, subsequent growth and development are not necessarily interfered with. Cells probably tend to change in character when increasing in size, and to change in size when being modified in character. Changes of one kind only are usually disturbing; hence, it may be stated as a general rule: *rapid growth should be accompanied or quickly followed by a corresponding change in development in order that arrest of development may not occur.*

After the inner growth tendencies have worked themselves out, and full normal size is attained, there is still some possibility of change in size of parts, especially of muscles. Sickness and lack of exercise decrease their size, while, in health, exercise increases it. Ordinary exercise during middle life maintains the size of muscles, while in old age the muscles are decreased rather than increased in bulk by special exercise. The old man of eighty who increased the size of his calves by bicycle riding was an exception to the general rule. The term "development" is sometimes applied to special increase in size of parts, produced by exercise, but the word even then usually implies also change

in quality of the part. A muscle, for example, when exercised, increases in hardness more than in size.

Nerve centers are capable of less growth through exercise than muscles; but they have greater capacity for development, or, in other words, for changes in cells and in connections between cells. Growth of the brain is nearly as complete at six as is growth of muscle at three times that age, whereas development of nerve cells is not complete at twice eighteen. Growth of the brain is due almost wholly to growth of the fibers connecting cells with each other, and this is an important phase of development, since the cells are thus brought into harmonious relation. The increased mental power that comes with age and training is the result, not so much of changes in individual cells, as of changes in those connections between cells which make possible the use of many parts of the brain in the accomplishment of a single purpose.

NATURAL ORDER OF DEVELOPMENT IN RELATION TO EXERCISE

Whatever may be true of the effect of exercise upon *growth* as a whole, it cannot be questioned that *development* is promoted by moderate exercise of the whole body. This is true during both the growing and the mature stage of life. As to particular parts of the body we know that changes in growth and development may be produced by systematic exercise of certain parts. This is well shown in the various types of athletes with extraordinary leg, arm, back, or chest power.

Again, occupations requiring the use of one arm or one leg only may produce overdevelopment on one side. Such excess of development of one limb over the other is, however, limited. Experiments show that when the right arm is used, nervous impulses are sent to other muscles than those used, and also to the corresponding muscles of the left arm. Gain in size and strength from systematic exercise of certain muscles is shared

by other parts of the body. For this reason some degree of symmetry is preserved when the exercise is largely one-sided. The development of internal organs, especially the muscles of the heart and lungs, is also affected by exercise of other organs; hence the dangers of overspecialization are diminished by this partial diffusion of the effects of exercise. Yet it is not difficult to destroy bodily symmetry by overexercise of parts, while equilibrium of functions of different parts is still more easily disturbed, so that ill health and death are not infrequent results of extreme specialization in exercise, *e.g.* a man who developed his muscles so that he could lift three thousand pounds, died from nervous exhaustion.

The effects of exercise on growth and development are practically the same for nerve cells as for muscle cells, except that the changes in size are not so great in nerve cells. Nerve cells not exercised because of loss of a limb or of a sense at an early age, as in the case of Laura Bridgman, are not quite as large as other cells and much less developed, *i.e.* have fewer processes extending out from them.

Muscular ability depends not so much upon the degree of development of muscles as upon the harmonious working of all the muscles concerned in a movement. It is therefore more a matter of nervous connections than of muscular strength. This is perhaps best illustrated in throwing and wrestling, where victory goes not to the strongest, but to the one whose muscles work together to the best advantage. A skillful thrower uses first the muscles of the legs, then successively those of the body, shoulder, arm, forearm, wrist, and fingers, and the ball, shot, or hammer leaves the hand with a force equal to the sum of the forces exerted by these muscles. An unskilled thrower, on the other hand, uses principally the muscles of shoulder and upper arm, and these not in harmony; hence, though he have the arm of a blacksmith, he may be beaten by a stripling baseball pitcher.

It is evident that special exercise of parts may be injurious because it overdevelops the parts exercised, and hinders rather than helps in the harmonious working of part with part. Extreme specialization is therefore to be avoided at all times.

During the growing period, when plasticity is greatest, extreme and permanent specialization is much more readily produced than in adult life, when plasticity is less and parts are already normally developed. It may be even questioned whether, in growing children, all specialization is not overspecialization. Boys who specialize in a single form of athletics at an early age in the secondary schools are likely to fail in college and university contests.

On the general principle that development should accompany or follow growth, it is probably best for children to have more exercise of one part at one time and of others at another; hence the tendency often noticed in children to specialize in one direction for awhile, then in another, is probably a good thing. Such specialization is directed by play and occupation interests, but is probably really determined largely by growth and development changes. Such specialization is usually temporary and in accord with the natural order of growth and development; hence, it is not injurious or disturbing.

If we knew the natural order in which the nerve and muscle centers grow and develop, we could perhaps devise physical and mental exercises that would be most favorable to perfect development at each stage of life. In the absence of such knowledge any attempt at special training during the growing period may interfere with the natural order of development, and disturb instead of promote harmony of function.

In all schools certain physical and mental activities are performed over and over every day; hence, with reference to all the child's powers there is a great deal of specialization, though the training is intended to be general rather than special. It is

altogether probable, therefore, that in giving children the training they will need in later life, at a time when they are in an earlier stage of development, we are to a considerable extent interfering with their natural order of development.

The studies of Bryan, Hancock, and others have demonstrated what is evident to every close observer, that, in general, children use the larger muscle groups earlier than those concerned in finely adjusted movements. It follows, therefore, that the large number of finely adjusted movements required in making small letters accurately at an early age must result in a specialization of the smaller nerve and muscle centers long before their natural time of development. Poor writing and drawing, which nearly always appear in about the sixth grade, may be partly the effect of lack of harmony in development, produced by the premature or excessive training of the finer muscle centers.

In the more purely mental sphere there is general agreement among students of children that children form crude, indefinite ideas involving only a few of the most obvious acts of analysis and synthesis. These ideas become more exact and definite with increased experience, just as movements become more accurate and definite with practice.

There can be no doubt, therefore, that the detailed analyses and exact definitions so often required of young children are opposed to the natural order of brain development, and therefore destructive of interest and disturbing to the natural processes of mental growth.

As the science of child study progresses, such interference with the natural processes of physical and mental development should become less and less. In the meantime, children should have plenty of opportunity to get an all-round physical and mental development from their plays and games, as a corrective of whatever injurious specialization is being produced in school.

Exercises for Students

1. If all children had their period of rapid growth at the same age, could the period of rapid growth be shorter generally in individuals than in the table? Since some children begin to grow rapidly earlier than others, may it be possible that individuals usually grow more rapidly and for a shorter time than appears from tables of average growth and yet the tables be correct? Compare the growth of yourself or others with tables and see if such is the case.

2. Have pupils mention individuals of large or small size, and give probable cause.

3. From observations and tables, report as many marked changes in size or shape of parts with age, also as many changes in physiological processes as possible.

4. Give illustrations of growth of parts due to special exercise, or lack of growth due to want of exercise. Why do insurance companies ask the height and weight of those they insure?

5. Observe how very young children throw, and how they make the movements of scribbling when they first attempt to draw, as bearing on the question of what muscle centers develop first.

Mention specifically school exercises that require too much fine muscular adjustment. Why is it more injurious to children than to adults to work in factories? At what age is it best to begin giving special training only?

6. The body of an adult is 58.5 per cent water, that of an infant 74.7 per cent, and of a fetus 94.5 per cent, while the amount of mineral matter in the bones of an infant is 2.24 per cent, and in an adult 7.29 per cent. What do these facts signify as regards growth and development? Give others.

7. May awkwardness and growing pains be explained by inequality in growth of parts, as of bones and tendons, and by want of proper relation between growth and development?

Can you see how growth changes might produce changes in such habits as writing?

Suggestions for Reading

On growth, read Donaldson, *Growth of the Brain:* Porter, *Am. Phys. Ed. Rev.*, Vol. II, pp. 155–173, or *Trans. Acad. Sci.*, St. Louis, 1893, Vol. VI, pp. 161–181; Gilbert, *Yale Studies*, Vol. II, pp. 40–100; Mrs. W. S. Hall, *Ch. S. Mo.*, Vol. II, pp. 332–342; Christopher, *Reports on Child-Study Investigations*, reprints from the reports of the Chicago Board of Education for 1898–1899, 1899–1900, 1900–1901; Hastings, *Manual,*

chaps. iii and iv, or *N. E. A.*, 1899, pp. 1076–1084; Burk, *Growth of Children in Height and Weight*, p. 73, reprinted from *Am. Jr. Psych.*, Vol. IX, pp. 253–326, and, if desired, other references given by Burk.

On growth in relation to health, see Key, *Pop. Sci. Mo.*, Vol. XXXVIII, p. 107; Christopher, *Ch. S. Mo.*, Vol. III, pp. 324–335; *Jr. Ch. and Ad.*, July, 1902, pp. 190–199; O'Shea, *Jr. Ped.*, Vol. XI, pp. 299–316.

On diffusion of impulses and the effects of exercise, see Davis, *Yale Studies*, Vol. VI, pp. 6–50, or *Science* (N. S.), Vol. X, p. 20; Johnson, *Yale Studies*, Vol. VI, pp. 51–103; Scripture, *Yale Studies*, Vol. II, pp. 114–119.

On the natural order of development in relation to exercise, see Burk, *Ped. Sem.*, Vol. VI, pp. 5–64; *N. E. A.*, 1899, pp. 1067–1076; Patrick, *Pop. Sci. Mo.*, Vol. LIV, pp. 382–391; Gulick, *Pop. Sci. Mo.*, Vol. LIII, pp. 793–805; Bryan, *Am. Jr. Psych.*, Vol. V, pp. 125–204; Hancock, *Ped. Sem.*, Vol. III, pp. 9–29; Sargent, *Am. Physical Ed. Rev.*, Vol. VIII, pp. 57–69; Gulick, *Am. Physical Ed. Rev.*, Vol. VIII, pp. 70–74.

On arrest of development, see Dawson, *Am. Jr. Psych.*, Vol. XI, pp. 188–197; Harris, *Education*, Vol. XX, pp. 453–466.

Later References

A complete bibliography will be found in the U. S. Bureau of Education publication on Growth by B. T. Baldwin. No. 10, 1914.

CHAPTER IV

NATIVE ENDOWMENT OF SPECIAL INSTINCTS

KINDS OF NATIVE MOVEMENTS

MAN can make machines that move about and do various kinds of work, but they all need a person to start and direct them. Nature, however, makes animal machines that move around and do various things without any one to superintend their movements. These animal machines must be self-running, self-repairing, and capable of moving so as to secure food and avoid danger.

The movements necessary to change food into the energy that keeps the internal machinery in running order are carried on almost wholly within the body, and are therefore called *automatic*. All the movements of the muscles of the lungs, heart, blood-vessels, and intestines concerned in the processes of respiration, circulation, and digestion are of this continuous, rhythmic, and self-perpetuating character. They depend mainly upon the relation of different parts of the organism to each other, and very slightly upon the relation of the organism to its environment.

In breathing, the stimulus of the air varies with the movements of the lungs; hence, the action is relatively constant and automatic. Such acts as walking are largely automatic since the movement of one limb serves as a stimulus to the motion of the other and thus walking continues without any fresh external stimulus.

The movements involved in securing food and escaping danger, on the other hand, are partially or wholly originated by some-

thing in the surroundings. In other words, they are called forth by an external stimulus, and hence are not self-continuing or automatic. Some are simple or reflex, and others complex or instinctive.

The simple or *reflex* movements are, as a rule, the response of a single part of the organism to a simple and not regularly repeated stimulus to that part. Examples are, the winking of the eye when the lid is touched, or jerking the hand away when it is pricked. Such movements occur whenever the appropriate stimulus is given, whatever the internal condition of the animal. The mechanism controlling them is very accurate, for just as the nickel-in-the-slot machine will not respond to a penny, so the hand will not be jerked away when touched, but only when injuriously stimulated, as by a prick or burn. All parts of the body are thus protected by reflex movements.

The complex or *instinctive* movements are a response of the whole or a considerable part of the organism to some external stimulus, such as taking, chewing, and swallowing food, and the movements of avoiding danger by hiding, running, or fighting. These movements, though initiated by an appropriate stimulus as are reflexes, are to some extent dependent upon internal conditions or stimuli. An infant will suck whenever his lips are touched, if there is also the internal condition or stimulus of hunger, but not if the stomach is full or out of order; and a hen will sit on a nest if she is in a broody condition, but not otherwise. Instinctive movements differ from reflex movements also in the fact that they are for the good of the whole body instead of for some one part. Winking the eye and jerking away the hand protect only the eye and hand, while taking food benefits not the mouth but the whole body, and running saves not merely the legs but the whole animal from danger.

Instinctive movements, such as sucking, are not easily distinguished from a combination of reflexes. When the tongue

and lips of an infant are rendered sensitive by hunger, contact with any object causes them to close around it reflexively. This movement affects the breathing reflex and causes sucking movements. The stimulus of milk on the tongue and the throat calls forth the reflex movements of swallowing. Loeb has thus analyzed a number of instincts into a series of reflexes, and it is probable that all instincts resemble a combination of reflexes in which the reaction of one part excites others, with the result that the animal acts as a whole and for the good of the whole.

TWO VIEWS OF NATIVE REACTIONS

According to the modern behavioristic view each animal is a mechanism for responding to external stimuli in ways characteristic of the species. Thorndike conceives of native movements as in the nature of many specific responses to various differing situations each of which is to be studied separately. For a close scientific analysis and study of behavior this view is favorable to the securing of definite and accurate data. Such infinity of detail is, however, confusing; hence, there is good reason for making some sort of classification or grouping of these specific reactions, at least in presenting the matter to beginners. For instance, it is much easier to think of the reactions connected with the getting of food, the avoidance of danger or the securing of mates, in separate groups under a specific name, instead of considering each of the many reactions separately.

Again it is not only simpler to thus view native reactions but it makes it possible for the scientist to interpret more successfully the data that he has collected regarding specific situations and responses. Figuratively speaking he can study the effect of forests on the landscape of life as well as observe individual trees. To the general principle of the survival value of special reactions may be added through classification, the idea of special needs to be met by certain *groups* of special reactions.

Those who regard these needs to be met as of more importance than the specific character of the reaction make use of the term "instinct" and designate by special names the various impulses to action that arise from the needs of the various species of animals. According to this view instincts furnish the impulse to all forms of animal and human activity whether the movements which meet the ends needed for survival are native or acquired.

Every living creature strives to secure food, and food of a certain kind, animal or vegetable according to its structure. Each becomes restless and crawls, walks, swims, or flies about when hungry, and when food is found, seizes it in a more or less characteristic way. In the higher animals and especially in man there may develop a variety of ways of securing food and of getting it into the mouth. The specific native movements for taking food are instinctive in the stricter and more objective meaning of the word, but it is convenient not only to designate such movements as instinctive but also to regard the hunger impulse, more or less specialized for certain kinds of food and varying with the condition of the body, as an instinct leading to the learning of other specific modes of reaction. This view not only simplifies the thought of native movements but aids in interpreting them and helps to explain why so many new movements for satisfying needs are developed. Furthermore in studying the development of human beings this view helps to explain the new phases in the emotional and intellectual life at different ages and the resulting changes in conduct, as due to changing impulses arising from the variations in needs, as the other does not.

One danger arising from this view is that many vaguely defined impulses shall be called instincts and no attempt made to analyze them and determine their exact nature and mode of manifestation. Another danger to be guarded against is that instincts shall be regarded as separate entities similar to the

"faculties" of the older psychology, when in reality they are merely phases of the "will to live," which we isolate, in thought, from the whole of which they are a part, in order to simplify our problem.

Internal impulses or instincts are always manifested in more or less definite and fixed forms of reaction to special situations, as well as in the general tendency to a variety of movements, and this should not be forgotten by those who use the term "instinct." On the whole, the author believes that more of the truths of human development may be presented clearly and intelligently to students by a classification of native reactions under the head of fear instincts, social instincts, etc., and by emphasizing the inner impulses of children at different ages, than by an exclusive study of special situations and responses at different ages. The latter view should, however, receive as much attention from students as time and capacity permit.

In one respect the difference between the two views of instinct is more than one of emphasis. In the "situation response" theory there seems to be little room for what may be called general responses either native or acquired. Yet there certainly are many instances of approach and avoidance that do not seem to be of a specific character. In the case of acquired movements this is especially marked. After a child has grasped several objects of varying shape in various positions, he has what may be called a general power of voluntary control which enables him to grasp a new object in a new position with considerable success. A person who has practiced writing with one hand only can write pretty well not only with the same hand in another position but with the other hand or with his foot or with his nose, the first time that he tries it. In the more complex activities of intellectual processes generalization is very prominent. The essential difference between these two views is, then, that according to one view there are only specific connections between parts, each

of which makes specific responses possible, while according to the other theory there are at first general tendencies to response not specifically determined in character. Also, out of specific responses to situations develop general powers of response.

From the physiological point of view the claim that native tendencies and movements are general as well as special finds support.

It is a fundamental principle of nerve physiology that the excitation of any nerve center, especially if it is intense and prolonged, is diffused to other parts and ultimately to the whole of the nervous system. The chief preventive of general and free spreading of nervous impulses at first is differentiation dependent on instincts. These make certain lines of discharge to muscles more open. Some paths of discharge are so open in young animals and children that specific reflex and instinctive movements are made at once, while others are less open and are used only slightly if at all, except when the need is not met by the first movements. Continued excitement gives rise to various movements toward escaping or securing food, some of which are definite and others of a more indefinite chance character. Any movement that proves successful is likely to be made again when the same circumstances recur and thus habits of reacting in specific ways are developed. In all learning there is some spreading of excitation and incipient movements of various parts; hence there is always some development of general control of muscles while specific movements are being learned. In the cortex of the brain during mental operations there is probably much more spreading of excitation from centers of more intense activity to all parts of the brain so that there is a good deal of general development resulting from special activity of parts.

The phenomena of mental grasp, "fringes of consciousness," associations of similarity, classification, and generalization cannot be explained on the theory of specific connections only.

There is therefore good ground in the facts of physiology and of conscious processes for believing that instinctive needs dependent upon bodily structure and conditions may result not only in some specific reactions, but also in many indefinite movements, and that, on the other hand, all learning of specific things results in some development of general power of doing those and other things. The stimulus and response theory is therefore an important but only a partial explanation of what takes place in instinctive and habitual reactions. There are always other reactions actual and incipient which constitute a reserve of general power and tendency.

In another respect modern physiology is unfavorable to the theory of special responses dependent upon the connection between nerve cells. It is becoming more and more evident that there are certain physiological norms peculiar to each species of animal which vary somewhat with age but are only slightly influenced by external conditions. Among these norms are the bodily temperature, the pulse rate and blood pressure, the character of the unexpired air in the lungs and certain chemical conditions of the blood. It is also known that action is modified not only by drugs but also by the activity of ductless glands and their products. These facts and the changes in the character of the blood accompanying emotional excitement all give good ground for believing that the instincts of each species of animal are closely related to its physiological norms. These norms are also doubtless the basis of trophisms and of native emotional reactions.

INSTINCTS AND STRUCTURE

The relation of instinct to intelligence or reason has long attracted wondering attention, but until recently little notice was taken of the relation of physical structure to instinct. When the matter is once suggested, however, no extended observation

is needed to show that the instincts of any animal correspond to its structure. Cats do not try to fly or dive when chased by dogs, nor ducks to climb trees or fight with their claws. Turtles do not attempt to run from danger, or rabbits to curl up in their skins for protection. The peculiar structure of teeth and stomach in cows goes with a strong instinct to eat grass, and in the lion, with an equally strong instinct to eat meat.

Even in the life of the same animals new instincts develop as new structures are formed or perfected. Birds do not show the flying instinct until their wings develop, nor the nesting instinct until they are ready to produce young. Before their teeth and claws are developed, young lions avoid, rather than attack, large animals.

There is a good reason, therefore, for believing that every instinct of each species of animals has its basis in some peculiarity of structure and some bodily condition. A slight difference in beak, claw, or wing of birds often makes a vast difference in the form in which the instinct to catch food, sleep, build nests, or escape danger, shall be manifested, while the character of the digestive organs and their secretions greatly influences the food reactions. A bird with the bill of a humming-bird and the instinct of a flycatcher, or one with the instinct of a woodpecker and the beak of a grosbeak, would be at a serious disadvantage in securing food.

Sometimes the difference in the actions of two species of animals is not easily accounted for by observation of external differences in structure, but in those cases a fuller knowledge of the internal anatomy of the animals, especially of the glandular and the nervous system, would probably reveal the basis of the difference. Every instinctive act therefore presupposes a mechanism and a bodily condition appropriate to its performance and in young animals these must be developed before the instinct appears.

INSTINCT AND CONSCIOUSNESS

We all know that the *automatic* movements are carried on without consciousness. The apparatus for these movements works best when not interfered with by consciousness. A little attention to the matter will also show us that the *reflex* movements of the eye and the withdrawal of the hand are the results of a definite mechanism which works without being started by consciousness. In fact, it is almost impossible for consciousness to prevent such movements even when they are foreseen. It is true that the fact of a stimulus being received and responded to by the hand or eyelid, is usually reported to consciousness, but this is after rather than before the movement begins.

That *instinctive* movements are also dependent upon mechanism rather than consciousness is not always so readily admitted. Yet the person who jumps at a loud sound or the sudden appearance of a frightful object, often says he cannot help it, and a moment after the fright may laugh at his own foolishness. When a cat races after a ball or a mouse, he does not think he wants it before trying to catch it, but the sight of the moving object sets the chasing apparatus in motion at once. In the same way the sight of a hawk excites the mechanism for making danger signals in the hen, and this sound causes the crouching and keeping-quiet apparatus to work in the young chicks. Persons and animals do not have to learn to do these things any more than they have to learn to breathe, and when performed suddenly they are just as independent of consciousness.

The mechanical character of reflex and instinctive reactions is well illustrated by the fact that a decapitated snake will coil around a red-hot iron as readily as around a stick. In this, as in other cases, there is evidently a definite mechanism which is set in operation by a certain stimulus or any stimulus like it. The dependence of instinctive movements upon structure rather

than consciousness is also shown with remarkable clearness by Jennings's experiments upon paramecia, one of the simpler forms of animal life. Their great activity in moving around, taking particles of food, gathering in companies, approaching CO_2 and avoiding acids, gives the impression that their movements are directed by consciousness, and that they exercise choice. Careful experiment and observation, however, show that it is chiefly a matter of mechanism. Their cilia are in almost continual motion, and thus their bodies are driven forward. If they approach acid, the cilia reverse, and thus they back off from that injurious substance. If, however, the acid is made to approach them from behind, the effect is the same upon the cilia, and instead of moving away from the fatal substance they enter it. CO_2 has the opposite effect upon the cilia, consequently when moving forward they enter and remain in drops of that. Choice of food is also lacking, for they take in every small particle they touch, whether it has food value or not. Careful observation thus shows that all their actions are largely mechanical.

Loeb has in a similar way analyzed the instincts of a number of animals into mechanical reflexes. The apparatus for stinging is in the last segment of the abdomen of a bee and works successfully when separated from the rest of the body if the under side is touched.

Fixed instincts, in man, work almost mechanically, as do many habits. Not only does consciousness not direct the activity, but so long as everything goes smoothly, there is little or no consciousness. Where acts are to be repeated over and over, and the same kind of movement made in response to the same stimulus, consciousness is unnecessary. It is only when several modes of response are possible that conscious activity is of any use. Such activity then distinguishes the different possibilities and chooses the one that past experience has shown will give the most desirable results. When a new animal is seen by another,

the possibilities of friendly advance, of hasty retreat, or of vigorous pursuit are suggested, and consciousness decides in the light of past experience with similar animals which form of reaction shall be made. If, however, the animal which appears is a hereditary enemy of superior power, the action of fleeing is mechanically performed with very little consciousness, unless flight is in some way impeded, when other possibilities, such as fighting, hiding, or feigning death, are suggested.

An animal having only one possibility of response in a given situation could make no use of consciousness. Only those animals which are sufficiently complex to have more than one mode of response to a given stimulus can profit by conscious intelligence. It is reasonable, therefore, to suppose that instead of consciousness making new movements possible, the acquisition of new possibilities of movement helps to develop conscious intelligence, especially in animals and children. With much truth, therefore, we may say that man makes many movements, not because of his great intelligence, but that he has great intelligence because of his many possibilities of movement. The marvelous skill of the bee in constructing his comb according to the best engineering principles is probably due, not to his intelligence, but to his mechanical structure, which renders it less easy or perhaps impossible for him to build otherwise.

Instincts, in so far as they are purely instinctive, are always blind. Speaking figuratively, it is only when two instinctive tendencies are aroused by a stimulus that the eye of conscious intelligence is opened to choose in the light of past experience the most favorable reaction.

In the case of animals like fishes and insects with only a few fixed instincts, the light of experience often reveals to the dim eye of consciousness but one mode of response, and the baited hook is again taken or the scorching light again approached.

In higher animals, like chickens and children, a single flash

from past experience, such as the unpleasant feeling of a furry caterpillar to the bill, or of a hot stove to the hand, may reveal to the clearer eye of consciousness a new and more desirable mode of reaction than that first used. The fewer the experiences needed to produce the change in the reaction necessary to secure the most favorable results, and the longer the time before the light enkindled by past experience is extinguished, the greater is the intelligence in animal or child.

Not extraordinary skill in doing the same thing in the same way all through life, by one generation after another, as in the case of animals with fixed instincts, but ability to act in a variety of ways and to learn quickly by experience, is evidence of intelligence. Man has more instincts than any other animal; but the variety of action possible to him, and the modifications produced by experience, make it seem as if he had none. We must remember, however, that his purely instinctive actions are just as blind as those of the bee, and that consciousness is useful only after there has been experience, and when there is a possibility of more than one reaction.

Conscious processes are most distinctive in that they facilitate the reversal of the usual relations between stimulus and reaction. Animals experience a need and are confronted with a stimulus, then react in an appropriate way. Man, in voluntary action, images the result to be gained, then acts. He represents many of the needs and situations to be met and performs the necessary actions of preparing food, guarding against danger, providing for the protection of offspring, etc., before reaction is necessary, because he can substitute conscious images or representations of needs and situations for the real ones, much better than can animals. The acts of animals are often anticipatory, but they possess little of man's facility for consciously representing past and future conditions and actions; hence, animals necessarily live and act chiefly in the present.

CONDITIONS AFFECTING THE USEFULNESS OF INSTINCTS

Evidently every species of animal which does not in general act for its own good would, in the struggle for existence, soon become extinct; hence instincts are in general useful. What is for the good of a young animal depends upon (1) structure of the animal, (2) its surroundings, (3) its temporary bodily condition, (4) its age, and (5) the instincts of its parents.

(1) If dogs had the instinct to dive when threatened with danger, and fish to jump out on dry land, neither would long survive as a species. If the puny rabbit had the fighting instinct of the bulldog instead of the running instinct of the deer, his career would have been cut short long before this. This merely emphasizes the truth already stated, that instinct must conform to structure in every species of animal.

(2) What form of action is favorable depends upon the environment. Birds in the south need to go north when it gets warmer; but if they are in the north, they need to go south when it gets colder. If the climate is too wet for an animal, he needs an instinct that impels him to seek dry places; but if it is too dry, he should have an instinctive tendency to seek water. Some animals have two fixed types of instincts with action suited to the two kinds of environment with which they are likely to come in contact. All muskrat houses built in pools are on the same general plan, while a different, but equally constant form is used when the nests are built in streams.

Those instincts of animals which are useful to them in their natural environment may become destructive to them when the environment is changed suddenly by geological agencies or by the entrance of man. Thus lights destroy countless insects and birds, and man makes use of the curiosity of animals concerning strange motionless objects, in luring them to destruction, and of the feeding instinct, to attract them by baits to his hooks

and traps. Those animals which most quickly adapt themselves to these changes in environment are the ones which survive in spite of man's cunning attacks. Every instinct must have developed in an environment where it was useful; but if the present environment is different, the instinct may be useless or injurious, and thus handicap or destroy instead of help to preserve.

If individual animals of slightly different structure, aided by their readiness in profiting by experience and possibly assisted by chance, vary their actions and develop successful ways of meeting the new situations in their changed environment, they survive and produce descendants, while the others soon perish. Thus may a species be modified in structure while either a new form of instinctive action is established as a characteristic of the species, or the quality of individual adaptability, which is the chief element in intelligent action, is increased.

(3) The condition of the animal at the moment also determines the usefulness of his actions. An animal which would turn away from food when his stomach was empty, and eat it when his stomach was already filled, would not long survive. A deer which had a strong impulse to fight just after shedding his horns instead of when they were well grown and firm, would be at a disadvantage in preserving himself and his species.

(4) It is evident that an animal when young and helpless and with parents to care for it needs to follow a different course of action from that required when well grown and dependent upon its own exertions for food and safety; while when mature and with young to care for, its instinctive action must be such that the species will be perpetuated. It follows, therefore, that to be useful, instincts must be adapted to different ages, as well as to differences in structure, bodily condition, and environment.

(5) It has been found that in general an animal at its birth has just enough instincts to preserve its life with the aid of the complementary instincts of its parents. For example, parent

robins have an instinctive tendency to carry food and put it into the mouths of their young; hence young robins need only to open the mouth when the parent robin approaches. The young chicken, however, has the instinct to approach and peck at food, since the mother hen has only the instinct to find and call attention to it. The human infant needs and has at birth few instincts, because the human parent has the instinctive tendency to care for it strongly developed. Later, various instincts come into prominence as they are needed.

FIXED AND INDEFINITE INSTINCTS

Evidently instincts are useful just so far as they successfully adjust the action of an animal to the condition imposed by its environment, in such a way as to preserve the individual and produce descendants. The actions which are always or nearly always useful to an animal of a certain structure in all environments, as, for example, those of gathering honey and building combs by bees, and web spinning and fly catching by spiders, are comparatively though not absolutely fixed and unchangeable; while actions whose usefulness depends upon special circumstances are usually general and indefinite in character. The young chicken has a fixed mode of drinking which is different from that of the duck, for instance, but its instinct to follow moving objects is more general, since it may be specialized into a tendency to follow a person or a dog as well as to follow a hen. The general instinct of fear is usually manifested in the form of fear of any strange object that is in any way exciting, and experience specializes this into fear of particular animals, as cats of dogs and mice of cats. The fear shown by hens when hawks sail over is probably general rather than special, since any large bird or even an object passing quickly overhead, excites it.

Through the experience of the ages and natural selection, nature has prepared her children to act in such a way that in

a majority of cases they and their descendants will be preserved, though in exceptional cases the action may prove fatal. Where the chances are nearly equal as to what forms of reaction to certain stimuli will be favorable, the instinct is plastic, so that the best mode of reaction in the present environment may be developed by imitation and by the individual's own experience. Even quite fixed instincts need to be and are somewhat plastic, so that there may be ready adaptation to changes in environment. In past ages it was universally advantageous for fish to take all worms and grasshoppers dropping into the stream; but when man came on the scene with hooks, the instinct often had bad results. The native instinct to snap at every worm when hungry has not been destroyed; but the more intelligent fish seem to have had the instinct modified by experience, as many fishermen can testify.

We therefore find some instincts that are perfect at birth, and unchanging throughout thousands of generations of the species, and others so imperfect at first and so variable in form that they can scarcely be distinguished from voluntary acts developed by individual experience. In general, the fixed instincts are more prominent in lower animals, and the indefinite in the higher. This is not so much because the higher animal has no definite instincts, but because he has so many general, indefinite, or undeveloped ones.

CONTINUOUS, TRANSIENT, AND PERIODIC INSTINCTS

Since the structure of an animal and the usefulness of any form of action vary with age, we should expect that the instincts of any given species of animals would not be equally strong at all times. Observation confirms this view. Some instincts, like the feeding and fear instincts, are present at birth and last all through life, though usually they are more prominent at some times than at others.

Other instincts, like that of play, are not present at birth, but after they appear, continue to be manifested all through life or nearly so, though usually in a diminishing degree. The instinct of chickens to follow is a transient one, entirely disappearing in a short time if not developed by experience.

Other instincts appear at regular intervals, as at the migrating season or when caring for young, and are therefore in a certain degree rhythmic or periodic.

The chief problem which child study has to solve is to determine the time at which each instinct of man is naturally most prominent. This being done, the problem of the educator is to apply the right stimuli at the right time, so as to produce the most perfect and rapid development along desirable lines.

GENERAL PRINCIPLES DETERMINING THE ORDER OF DEVELOPMENT OF INSTINCTS

In the plant world the order of development — leaves, stalk, blossom, fruit — is very definite and fixed. In the animal world the growth of parts of the body and the appearance of hair, horns, etc., are fixed and nearly as unvarying. Since structure and instinct are closely related, we should expect to find a definite order in which the instincts of each species of animal tend to develop. Observation confirms this view in a general way, as young animals do not show the mating, migrating, nest-constructing, and care-taking instincts of adult animals, nor adult animals the same degree of playfulness as the younger ones. When, however, we attempt to determine exactly the order in which instincts develop, many difficulties arise.

The most common theoretical statement of the order in which instincts develop is that they appear in the order in which they have been acquired in the history of the race, from the lowest forms up. This view is supported by the general biological law discovered in the study of embryology, that in the embryonic

state each animal goes through stages of development in which it is successively similar in form or proportion of parts to a higher and still higher animal, till it attains the form of its species. There are also numerous parallelisms that can be pointed out in the development of a child after birth to that of the human race since it has become human. This law of race and individual development is supposed to apply not so much to the first appearance of the various instincts as to the time of their greatest prominence. It is now given less weight than formerly.

There are two other theoretical considerations, however, that should receive attention. In the first place, those instincts which have been most universally useful to all species of animals in all ages, rather than the oldest, should be the strongest. For example, the swimming instinct is probably one of the oldest instincts, but it has been of little use among many species of animals, hence it is not strong in all young animals. The instinct to withdraw from an unfavorable stimulus has, however, been useful to all animals in all stages of development; hence, it is universally present and prominent in young animals.

Again, we have noted the truth that different instincts are needed at different stages of development. If instincts developed in the same order in the individual as in the race, in any species of animals, that species probably would not long survive, since the reproductive and care-taking instincts are useful to the species only when they appear in mature animals. Hence, though the parental instinct is one of the oldest instincts, it is yet one of the latest to become prominent in individual development.

The idea that instincts need to vary with age is probably the most important general principle in giving an understanding of the order in which the various instincts develop.

CAUSES OF DIFFERENCES IN INDIVIDUALS OF THE SAME SPECIES

Since the appearance of instincts depends upon structure and physiological conditions, especially nutritive, an animal must be in good normal condition to show forth at the proper time feeding, playing, fighting, and sexual instincts. Any variation in the health conditions of an individual will therefore greatly modify his instinctive development.

Since instincts depend also upon outer stimuli, the appropriate stimulus must be presented at the time when, because of the internal bodily conditions, the instinct is ripe, or the instinctive reaction may never appear. For example, the swimming instinct does not appear in ducks except in the presence of water, and perhaps not without actual contact of the whole body with it. For this reason environment may favor the development of some instincts at certain times much more than at others. If the proper stimulus is never given, or if the instinctive tendency is transient, as is sometimes the case, the instinct may never appear. For example, the instinct of burying bones shown by most dogs either does not appear, or appears only a few times if, while young, they are kept constantly on boards. It is doubtful if chickens would scratch if kept all the time on a smooth floor with no unevenness as stimulus to their feet. Neither are they likely to follow unless the instinct to do so has exercise during the first few weeks.

Although most instincts are stronger at certain ages or at certain times of the year than at others, yet most of them continue to exist in some degree during the whole life of the animal, both before their evident appearance, and after the instinctive tendency ceases to play a prominent part in the actions of the animal. Some instincts vary but little in strength all through life; yet even these may develop in quite different ways in different animals of the same species because of early experience.

For example, the feeding instinct is always present, but animals and persons in certain localities get into the habit of eating certain things and no longer have an impulse to try any other kind of food when it is presented, though when young they would have taken it as readily as what they now feed upon exclusively. The feeding instinct is specialized, yet, if hungry and unable to get their habitual food, such animals and persons take new foods which ordinarily they would not touch. It is even claimed that ponies in some localities feed on fish.

It is evident that, with all these complications, the most common and natural order of development of instincts in animals is very difficult to determine. The problem is still harder in children, who have so many instincts, most of which are, during a long period, easily modified by special conditions. Something, however, has been determined, as will be indicated later.

CLASSIFICATION OF INSTINCTS

In attempting to classify instincts it is not possible to classify them according to the nature of the stimulus or the kind of movements made, or the bodily or mental states of the animals, for these are all so various that they cannot be grouped under a few heads. Again, those features are not of universal significance, since what is a useful stimulus or movement to one animal is harmful to another. Since all instincts owe their existence to their usefulness, the uses subserved by the various instincts should be the basis of classification. To a considerable extent all animals have the same general needs; hence, a classification based on the *ends* gained by instinctive acts will apply to all forms of animal life, including man.

(1) All tendencies to action which have for their primary end the good of the individual may be called *individualistic* or *self-preservative* instincts. The most fundamental and universal form of this instinct is shown in the tendency to contract the body

and withdraw from unfavorable stimuli, and expand or approach toward favorable ones.

In its most primitive form the tendency to approach favorable and recede from unfavorable stimuli is found only in the tendency to move so as to increase favorable or decrease unfavorable stimuli *already being received.* For example, all animals, and even plants to some extent, move toward or away from light, heat, chemical and mechanical stimuli, so as to get more or less of them according to the nature of their organism. This is known as trophism. Besides this tendency, which is universal in all animals, from the highest to the lowest, most animals have a disposition to move about and to react in appropriate ways in response to certain stimuli, before there is any chance to experience their favorable or unfavorable character in even a slight degree.

The chief ends subserved by the individualistic instincts are the securing of food, and the avoidance or defeat of enemies. The chief forms of this instinct may be designated as the *feeding, fearing,* and *fighting* instincts.

(2) If animals (except the lowest, which are without sex and multiply by division) had no instincts except those connected with self-preservation, there would be only one generation of each kind. To live as a species, animals must have instincts impelling them to produce and care for young, as well as those impelling them to preserve their own lives. Not only must they have these instincts, but in most animals at certain times the *racial* instinct must be stronger than the individualistic instinct, so that animals with young will deny themselves food and risk their lives to feed and defend their offspring from danger, otherwise the species would not continue to exist.

All actions, therefore, which have for their primary end the producing of young, and preparing for and taking care of them, are classed under racial instincts. Hence, under this head we may include, with the more obvious actions, those less directly

related to the perpetuation of the species, such as singing, self-exhibition, fighting for mates, and nest building.

(3) Many lower animals, such as bees and ants, always live in colonies, and have instincts which impel them to act primarily for the good of the group to which they belong, and only indirectly for the good of themselves or their species. In many instances there are in each group several different types of individuals with corresponding differences in instincts. In the case of bees and ants there are nearly always three or more types in each community. Some of the higher animals, such as wolves and cattle, go in groups a part or all of the time, and coöperate in securing food and escaping danger. In so doing they act not merely for their own good and for the good of their species as represented in their young, but for the good of the group to which they belong. All kinds of actions in response to the stimulus of one's own kind may be regarded as social.

The predominance of man over other animals is due in no small part to the greater tendency of men to arrange themselves in groups, and cöoperate for the common good in attack and defense.

(4) Since all the higher animals come into the world in an unfinished state, they need to be and are very plastic to surrounding forces which develop and mould them so that they become capable of surviving and making their own living in the environment into which they are born. Mere clay-like plasticity to outside impressions, however, is not sufficient. During infancy, when the young creature is protected, he is active in ways that prepare him for the serious situations that he must meet when no longer protected by parents. The young animal not only adapts himself to his environment by responding to the stimuli he receives, in ways most favorable to himself, but he actively seeks stimuli and repeats actions when their former stimuli are not affecting him. This inner tendency to actively increase the

number of stimuli and reactions is the basis of the *adaptive instincts*, the chief forms of which are *imitation*, *play*, and *curiosity.*

Imitation may be defined in a general way as the tendency to repeat what has been perceived, especially the sounds and movements made by others of the same species. In imitation there is an outer stimulus that calls forth a movement producing to some extent the same stimulus. It is evident that this tendency is often of direct use to an animal in adapting itself to its surroundings; for the young animal that imitates his elders (which are already adapted to their environment), in seeking shelter, selecting food, and avoiding enemies, is much more likely to survive than the one who must learn what is good for him from his own chance experiences, any one of which may result fatally. The advantages to the child who has so much to learn are still greater; hence, he is the most imitative of all young animals.

Play, or the tendency to perform acts for their own sake rather than for the ends to be gained by them, is of direct use to all immature animals because it gives practice in performing acts before there is any serious need for their performance, or any dangerous results from imperfect performance. It is evident that animals which play at chasing and fighting when young will have a great advantage in the struggle for existence, when they have to make their own way in life, over those that have not played in youth. Surplus energy tends to flow out along old racial channels as fast as their beginnings are developed in the young animal. Every instinctive tendency is therefore manifested in play, and is thus perfected for future use. Surplus energy is a favorable condition for play, but what is played at any time is determined largely by the degree of development and the relative prominence of the instincts which are not needed for serious purposes.

Curiosity, unlike imitation and play, is concerned more with the securing of sensations than with modes of action. It is an

intellectual hunger, an impulse to secure and test new sensations. An animal that possesses it soon comes in contact with all phases of his environment, and examines every new thing as it appears, before attempting to eat, attack, or run away from it. It is quite evident that under natural conditions a young animal with curiosity will become adapted to its environment much sooner than one without such an instinct.

It is not too much to say that curiosity is the basis of a large share of the intellectual development in animals and in man. Every new thing introduced into a familiar environment is a stimulus to curiosity, and every new relation of object or idea to other familiar ones is equally effective in man; hence curiosity is to the intellect what appetite is to the body — a cause of growth and development.

(5) It is not easy to demonstrate clearly the existence of regulative instincts, though good general grounds for affirming their usefulness and their existence in man are easily found. Evidently, every species of animal that is to survive must conform to the laws of nature and the environment in which it lives. Every organism must conform to the laws of rhythmic, seasonal changes imposed by the sun; hence a tendency to conform to constant environing conditions, or, in other words, to act according to law, has naturally developed. Again, the several varieties of instincts often impel to opposing actions, and the tendency is for the strongest and most quickly acting instinct to determine action, although safety for the individual and species may lie in the direction of the action suggested by a more slowly acting instinct. In such cases a tendency to pause before acting and give slower instincts time to awaken and exercise their rightful influence would be of advantage. Something to make the instincts work together for the good of the animal and its species would evidently be useful.

Such an instinct probably exists, in man at least, in ~~the~~ *moral*

tendency to conform to law and to act for the good of others as well as self, and in the *religious* tendency to regard a Higher Power. This instinct gives rise to a feeling that one ought to act in conformity with certain laws fixed by the experience of the race, or by customs and habits of groups of individuals, and to a feeling of reverence and awe in the presence of the Power back of these laws.

(6) Actions for the attainment of the various ends already enumerated, and numerous combinations and oppositions of ends and means of attainment, give rise to many tendencies to action and feeling that are not easily classified under any of the previously named heads. Among the most prominent of these impulses and associated feelings are: (1) the tendency to collect objects of various kinds and to enjoy their ownership; (2) the tendency to construct or destroy and the pleasure of being a power or a cause; (3) the tendency to express mental states to others of the species and to take pleasure in such expression; (4) the tendency to adornment and to the making of beautiful things and the æsthetic pleasure of contemplating such objects.

Exercises for Students

1. As a machine, how does an animal differ from other machines?
2. Do acquired movements ever become nearly as automatic as breathing? Illustrate.
3. Give examples of instinctive and of reflex movements.
4. Illustrate the fact that structure and instinct correspond not only in different animals, but also in the same animals at different times. How can naturalists infer the instincts of extinct animals by examining their bones?
5. Are there any acts that you can perform better when not thinking of them? What kind of acts are they?
6. Why does an architect need to be more intelligent than a mason, or a squirrel more intelligent than a fish?
7. When is a deer probably most conscious and fearful, when fleeing from danger or when cornered?
8. Give several illustrations of learning from few experiences by animals or children as evidence of intelligence.

9. Give illustrations of the various conditions affecting the usefulness of instincts.

10. Give examples of fixed and of indefinite instincts.

11. Give illustrations of transient or periodic instincts.

12. Give some parallels between the development of the child and the race.

13. Illustrate how the instincts of individuals may be modified by accidental causes.

14. Give illustrations of each class of instinct.

Suggestions for Reading

The best chapter on instinct is in James's *Psychology*, and one of the best popular books on the subject is Chadbourne's *Instinct*. All books on animals treat of the subject.

The following chapters bear on the nature and use of instincts: Morgan, *Animal Life and Intelligence*, chap. xi; Romanes, *Mental Evolution in Animals*, chap. xi; Wundt, *Human and Animal Psychology*, chaps. xxvi and xxvii; Marshall, *Instinct and Reason*, chap. iii; Baldwin, Vol. I, chap. viii; Jordan and Kellogg, *Animal Life*, chaps. xiv and xv.

The relation of instinct to consciousness and intelligence is discussed ably in Morgan, *Animal Life and Intelligence*, chap. xii, and *Comparative Psychology*, chap. xii; Minot, *Pop. Sci. Mo.*, Vol. LXI, pp. 289–303; Baldwin, Vol. I, pp. 208–214; Watkins, *Am. Jr. Psych.*, Vol. XI, pp. 166–180.

The mechanism of reflex and instinctive movements is discussed by Jennings, *Am. Jr. Psych.*, Vol. X, pp. 503–515, and in Loeb's *Physiology of the Brain*.

On the general order of development read Vincent, *The Social Mind and Education*, pp. 66–90; Swift, *Jr. Ped.*, Vol. XII, pp. 295–303; Guillet, *Ped. Sem.*, Vol. VII, pp. 397–445.

Later References

BOOKS

Bolton	Mc Indoo	Sandiford
Chamberlain (1)	Mills	Shepherd
Drummond	Mitchell	Swift (1 & 2)
Forbush	Parmlee	Tanner
Gesell	Partridge (1 & 2)	Thorndike (1, 3 & 8)
Hall, G. S. (1)	Pyle	Watson
Kirkpatrick (1 & 2)		

CHAPTER V

MODIFICATION OF NATIVE ENDOWMENTS

NURTURE AND DEVELOPMENT

THE native endowments of the individual at birth are only possibilities and these become realities in greater or less degree according as the environment furnishes conditions and stimuli for their development. This environment must supply at least the essentials for maintaining life. In addition to this, human beings especially are provided with numerous mental stimuli. These come primarily through the senses. These stimuli are provided by the material objects of nature and art and by living creatures, especially those of one's own species.

These stimuli are effective in calling forth activity and in producing development not merely in proportion to the objective strength of the stimuli, but in accordance with the special sensitiveness produced by the internal conditions of body and mind at the time. When one has eaten to repletion, the strongest food stimuli become weak; and when one knows nothing of plants, a lecture regarding them may be a bore.

Persons in the same surroundings are not receiving the same nurture, for as their natures differ so does their influential environment. Just as potatoes and pumpkins may be produced in the same soil, so persons differing greatly in character may develop in the same community and even in the same home.

Circumstances of a more or less chance character also play a considerable part. Except in the case of twins the effect of a given stimulus is likely to be different because the ages differ,

and with age, instincts and experiences. One child may be delighted and the other terrified by the sudden appearance of a big black dog. Even in the case of twins if one first sees the dog when it is quiet and he is in the presence of others, while to the other it suddenly appears when he is alone, the effects will be different, not only at the time but in the future when similar stimuli are received.

Environment begins to act as soon as one is born and continues its influence all through life. The development of an individual may be modified by changing his surroundings. These changes will be effective in proportion as the individual is or is not sensitive, because of ripening instincts or previous experience, to the particular portion of the environment changed. Means may also be taken to call attention to special features of the environment and thus make them effective influences.

Young animals and children are always protected to a greater or less extent from many phases of the life about them. To children, parents and schools are a more or less artificial environment, while to both young and old, social customs, especially in the group to which one belongs, call attention to certain kinds of stimuli and encourage certain kinds of responses to each type of experience.

INSTINCTS AND LEARNING

In all living things growth is from what already exists. In the plant the roots and stalk come from the seed, the branches from the stalk, the leaves from the buds; and each new phase of development in the plant depends upon and is the outcome of the preceding stages. In a similar way does all learning take place. It begins in the modification of instinctive acts and each new stage of learning is the outgrowth of previous acquirement. Learning is a process of modifying the instinctive actions in becoming adapted to the special environment affecting the organism.

A chicken and a baby have the feeding instinct not only in the form of sensations of hunger and of a tendency to motion of some kind but it is manifested in the movement of certain parts of the body in specific ways in response to food and other stimuli connected with feeding.

The chicken, when hungry, pecks at *any* small object that is clearly differentiated from its surroundings, whether it be a particle of meal, the eye of its mate, or its own toe. With practice the movement becomes more accurate and is associated with movements of the legs in approaching objects and in poising the body for pecking. The grasping with the bill and swallowing of loose particles is also instinctive and only slightly improved with practice. The next step in learning is to cease from pecking at objects that cannot be clasped by the beak and to limit the pecking more and more to those kinds of objects which give satisfaction when taken into the mouth. Another step in learning to eat is taken when the young chicken runs to the mother in response to her food call; whether the response to this call is instinctive or whether the sound merely draws attention to the food particles that the chicken has already learned to observe, approach, and peck, is doubtful.

The next step in learning is based on the instinctive tendency to move the feet in a certain way when they are stimulated by an uneven surface. This occurs in association with the picking of food particles and results in the chicken's learning to scratch for food. Having progressed thus far, whenever he is stimulated by hunger he moves about; and if he sees anything resembling a bit of food, he pecks it, or if he is on an uneven or soft surface where food is concealed, he scratches and pecks alternately. If a chicken is with a hen, he learns to follow her, partly perhaps because of an instinctive tendency to follow moving objects, and partly because the satisfaction of getting food is more frequently experienced near the mother hen. When, however, he grows

more skillful in getting food for himself, he finds less competition at a distance from the mother, where there are not several other chickens ready to seize upon each morsel.

If food is more frequently found at certain places than at others, he learns to go to those places for it. If he sees some one bringing the food or hears a call as it is brought, he soon learns to come for food when the same stimuli are seen or heard. This learning may be further specialized into a response to a specific call or the sight of certain movements.

Again, a chicken may be put in a maze and fed when he gets out and may thus learn to pass accurately through a rather complicated network of paths in order to get food. Various other tricks may be taught him, providing in each case the new movements are associated with the sensations of hunger, the instinctive and acquired movements already known, and the getting of food. Looked at in a broad way we see that the general condition of hunger calls forth varied movements, external stimuli produce special reactions, and any movement that brings satisfaction is selected for survival. Such movements, as they are repeated, become more restricted as to the exact nature of the stimulus calling them forth and as to their number and accuracy. When the response to a specific stimulus has been repeated until it is made in the same way every time, a habit has been formed.

The progress of a child in learning to eat may be traced in a similar way, but it is more complex and the things learned may be much more remotely associated with the feeding instinct. It extends not only to the child's own bodily movements, but also to his manipulation of implements such as spoon, knife, and fork, and, later, to the learning of an occupation, partly in response to the feeding instinct. It leads not only to the learning of movements, but to the formation of images concerned with food. A hungry person can scarcely avoid such images either when awake or at night in his dreams.

The learning involved in modifying, perfecting, and extending native reactions and the association of external movements and of mental states with the inner impulse to secure some instinctive end, is in all cases of a character similar to that described in detail for the feeding instinct.

There are only partial exceptions to this general principle of learning. Many animals, and especially young children, make a great many impulsive movements which seem to be of a chance character. Often they are instinctive movements only slightly specialized to meet the situation. These combine with and modify the more definite instinctive movements, and in a more or less chance way one of them brings favorable results and is then selected for repetition and specialization.

Training and teaching must always start with instinctive reactions as modified and extended by previous experience. A person who wishes to train a horse to answer questions, for example, may begin with the tendency to respond by lifting the foot and putting it down again when the shin is struck. This tendency may be developed into a response when a stick is seen to move toward the shin, then to the stimulus of a glance and word from the trainer. A horse may then be induced to begin pawing and to continue until another gesture is the signal for stopping. Such a horse may then be made to appear to count and solve arithmetical problems by pawing the required number of times. In a similar way the training and teaching of a child is a process of modifying instinctive and habitual reactions and developing new ones in association with them in such a way as to produce coördinated movement and thinking.

MODES OF LEARNING

It will be seen that the chicken starting with instinctive reactions learns by his own movements, and not directly by what others do. Many movements are of a more or less chance or

trial character when the situation is unusual and the particular movements to be learned are largely new, as when an animal is trying to get out of a cage. A chicken, a dog, or a cat, if placed in a cage, learns to get out by this method of trial and success. He goes to all parts of the inclosure and does various things until he happens to make the movement which opens the door. Such an animal may see his mate who has learned how to escape from the cage perform the act again and again, but when placed therein may himself make just as many trial movements before getting out as did another animal who had not seen others escape.

In the case of monkeys and some other mammals, an animal who has seen another get out of a cage will profit to a slight degree, in that he frequently confines his operations chiefly to the part of the cage where the successful movement of turning a button or pulling a string was made by the trained mate, instead of scratching and biting at various places. Very rarely do animals, even monkeys, make the specific movement which they have seen bring success to another.

In contrast with this a child will notice the specific character of movements made by others and then reproduce those movements with approximate correctness, increasing his accuracy with practice. In other words children *imitate* to a great extent in learning to do new things, whereas animals make very little use of this method of learning. This is one reason why children can learn so many more new things, much more complex ones, and so much more quickly. Children usually attain their first approximate success through imitation, while the animal can only succeed through repeated, unguided trials. The most marked exception to this general rule is found in the imitation of sounds by parrots and some other birds. Trainers of animals make very little use of imitation, while trainers of children constantly use it.

Animals perfect and modify instinctive reactions through a

primitive form of imitation, as when they go with companions in search of food and join them in fleeing from danger; but in learning newer and more complex movements imitation plays little part. A chicken, a cat, or a dog will develop the usual movements and cries of his species when he grows up alone, as accurately as when he has companions, but the process may be slower. A child, on the other hand, without persons to imitate, will scarcely be human in his actions.

There is another method of learning open to man that is utterly closed to animals, that of learning through the symbol and thought method, or, as it is sometimes called, the "*method of understanding*." It is true that animals may be taught to understand language in the sense that when certain words are uttered they will perform a certain act; *e.g.*, "Rover, go get the cows" may send the trained shepherd dog flying to the pasture. In no case, however, is it possible for an animal to *learn* to do new things through the medium of words only, as can a child. You may give a command to an animal and, as he makes various trial movements, direct him by gestures and by warning or encouraging cries, according as his movements are in the direction of failure or success. If he finally does the right thing, a reward and further practice will soon result in his learning what to do when that command is given. The dog has learned *to respond* correctly to your words, but he has not learned *by means* of your words, and no animal can be taught in that way.

A child learns the meaning of words as does the dog, but ultimately he gains such a power of separating and combining the ideas corresponding to word symbols that he can learn of objects and events that he has never witnessed, and he can learn to perform complex movements from description and practice only. With this method of learning open to him, a child may profit by all the transmitted experience of companions and of the race; while animals gain nothing except from their immediate

companions, and that learning is limited in amount because specific new movements are imitated rarely or not at all.

It is evident that the child has a great advantage over animals in his free use of two methods of learning which are not open in any considerable degree to them, each permitting him to learn by the experience of others. For both children and animals, however, personal experience is the fundamental form of learning. In such learning, direction of movements by the teacher is not sufficient. There must be some sort of stimulus and some sort of end to be gained associated with the movements. If an animal is held while in a cage and his foot made to turn a button, then is taken out of the cage and given food, he makes very little progress in learning to get out and get food; but if when he is trying to get out he is assisted in finding and turning the button and then allowed to go out and get food, he learns very quickly. In a similar way a child may be aided in learning to do what he is attempting, but unless he is active in responding to a certain stimulus or situation for the purpose of securing some desirable result, putting him through the motions has little effect. On the other hand, he has such power of representing movements that if he desires to learn how to respond to a certain situation, he can often do so with little practice if he sees the act performed by some one else or if he hears or reads a description of how it should be done. It is because of this power of mentally representing or performing the movements appropriate to certain situations that the child can learn so much more rapidly than can any animal.

Teachers, however, presume too much regarding this mode of learning by children. Such power is not possessed until they have learned a great deal through their own actual experiences and it cannot be effectively utilized if the child is led to represent the process only without a clear representation of the situation to be met and the end to be gained. Much of the arithmetical

and other teaching is a failure, because the teacher dwells on the process to be used without the child's appreciating the situation to be met or caring for the end to be gained.

The younger the child and the more unfamiliar the thing being taught to him, the more important is the method of learning by actual trial and experience leading to success. The method of imitation may be used as an aid in directing practice. Later, words may be used in guiding the attempts at imitation, and finally one who has had sufficient experience in a given line may be taught by means of words only, but the learning is not effective until the directions have been put into actual practice. Much of what is taught in school has little permanent result because the things learned are not connected either actually or in imagination with the situations that make them significant, and are not put in practice for years after they are learned.

THE PHYSIOLOGY OF LEARNING

Learning is possible because whenever certain parts of an organism act together or in immediate sequence in a certain way, with results that are not unfavorable to the organism, changes more or less permanent are produced in those parts which make them more ready to act in the same way in response to a stimulus or situation similar to the one which previously initiated the action. This general principle holds for all living creatures from the highest to the lowest, and for all sorts of tissues. It applies to glands as well as to nervous and muscular tissue. The salivary glands may learn to respond to certain sights or odors or even to images of them, just as the muscles of the arm and hand may learn to manipulate a spoon in getting food into the mouth. This characteristic of preserving the effects of past activity is probably greater in the nerve cells than in any other part of the body. Nerve tissue of a highly developed character constitutes a larger proportion of the human body than in the case of almost any

other creature. This is probably the reason why man can learn so much more and so much more quickly.

The exact nature of the changes produced in nervous and in other tissue by activity is not known. It is probably partly nutritive in character, since the results of any given act of learning are greater when the organism is healthy and unfatigued. The effects of practice also seem to be greater when it occurs at proper intervals. This probably is because some of the tissue is used up by the activity and must be replaced by new material. This replacing takes place best during periods of comparative rest, especially during sleep. Again, the permanency of the effects of activity depends in part upon the vigor or intensity of the action, intense activities producing more permanent effects than slight ones, although activities that are too intense may lack in definiteness because of the spreading of activity to other parts, or there may be overstrain and consequent failure of proper rebuilding processes. Similarly, very brief activity has less permanent effects than more prolonged, providing the time of continuance is not too great. To increase muscular and nervous power and to make impressions permanent there is probably an intensity and a period of continuance of activity more favorable than any other, though these differ for different processes, different persons, and varying ages.

One of the most important laws of learning is that regarding summation of the effects of repetition. Each new repetition adds its effects to those of preceding ones and the tendency to that type of activity grows ever stronger. It is not a matter of indifference as to how closely repetitions follow each other. If they follow with great rapidity for a considerable time, fatigue similar to the overstrain of intense stimulation or exertion is the result. On the other hand, if the intervals between repetitions are very long, the effects of the previous repetition may have nearly disappeared and many repetitions may be made in a period

of years without producing a very distinct effect on memory or on skill in doing.

There is reason for believing that there are two kinds of intervals between repetitions to be recognized as conducive to the most efficient learning, viz., several repetitions at short intervals followed by another group of repetitions after an interval sufficiently long for nutritive changes to take place. For example, one may practice making certain letters or playing a certain piece or practicing a certain stroke in tennis or golf a number of times one day, then repeat the period of practice the next day. What the most favorable period of practice is and what the most favorable interval between periods, varies with the nature of the activity, the personality, and the age of the individual. In general, short periods are better in the case of simple activities, for younger persons and for individuals who fatigue quickly. As to intervals, in the absence of positive proof it is probably best to give preference to that of one day, corresponding to nature's rhythm, associated with which there is known to be a physiological rhythm. This principle, however, should be recognized, that the favorable interval probably varies with the stage of learning. The effects of repetition disappear rather rapidly at first, then more slowly. In the early stage of learning it is advantageous to have practice periods follow each other often so that the effects shall not decrease too much; while in the later stages of learning, long intervals result in only slight losses. After anything has been pretty well learned one or two repetitions at intervals of a week, a month, or even a year may restore almost completely one's former ability, while a beginner practicing at such intervals would never attain much skill.

THE PSYCHOLOGY OF LEARNING AND OF EFFICIENCY

The principles enunciated under the physiology of learning also have their psychological aspects. In learning complex

acts, the more distinctly psychological processes play a large part. Along with selection of the more favorable reactions and parts of actions for repetition and the elimination of useless movements, there are usually changes in the intensity and in the direction of attention. The act as a whole requires less and less intensity of attention, until a very complex process may be carried on while thinking of something else. Before this stage of learning has been reached there has been a good deal of limiting and shifting of attention. In serving a tennis ball, one at first consciously looks to see how the racket is held and how it is brought in contact with the ball. He also notices the feeling of the racket in the hand and the arm and wrist sensations as the strokes are made. With practice, less and less attention is given to these phases of the process and more and more to the kind of motion to be given the ball and to the place where it is to strike.

Some instructors in the early stages of practice not only direct attention to the position of the racket and the kind of arm movement being made, but prolong the practice of separate phases of the movement with attention to the details. Others show how the movement as a whole is made and from the first direct the attention of their pupils to the end to be accomplished, with only occasional and temporary direction of attention to changes in the stroke needed in order to accomplish the end effectively. If teacher and pupil are both quick to see what changes in movement are necessary in order to meet the situation properly, progress is very rapid because little time is wasted in useless practice of parts of a complex series of movements and in attending to details that are best dropped out of consciousness as soon as possible. On the other hand, if the pupil does not make many changes in his manner of holding and swinging his racket or does not notice the changes that he does make and their effects, he may practice a great deal with little improvement, unless the

teacher directs his attention to the essentials and drills him on special phases of the process.

In all practice there is more or less variation in the mode of performance and a selection for repetition of the movements which bring the most favorable results. This is true to some extent whether or not there is consciousness of the fact. A horse may learn to wind from side to side in going up a steep hill, or a boy may learn to maintain his equilibrium on a bicycle, without being conscious of the changes in movement involved. Conscious attention to the right details may, however, in some cases, lead to much quicker learning. For example, a young animal when put in a cage may make a much greater number and variety of movements than an older one, but it is found that frequently the older animal will discover more quickly just what movements have helped in getting out. In solving puzzles a child will begin at once, attempting to do the thing in various ways; while an adult is more likely to consider what is essential and select particular movements to be made, before beginning to work. He also notices more definitely what happens and hence usually gets the solution with fewer trials than the child who makes the same false moves again and again.

An expert in manual work *makes no useless movements* and an expert in the performance of intellectual tasks *attends* to nothing that does not help him attain his ends. Some persons in learning seem to hit upon efficient methods by luck or genius, while others consciously discover one by one the elements that contribute to efficiency, and still others learn little by practice and always do things only with the expenditure of a great deal of energy.

The problem of the teacher is to know what details to call attention to and how long to dwell upon them. In general, it is not well to prolong attention to details that are better ignored later. It is also usually better to call less attention to sensations being experienced by the learner and more to the

results being obtained. If a child can be induced to grasp a spoon, a pen, or a tennis racket correctly and to make the proper motions without calling his attention to the exact way in which he is to hold and move his fingers, then his attention may be given more completely to the results he is securing by his movements of the implement. Prolonged attention to the bodily sensations interferes with rather than hastens the process of learning.

Another principle of supreme importance nearly always violated by teachers is that special attention should not be called to mistakes that are made. Such directing of attention naturally results in the repetition of the mistake, and only a learner with intelligence and a great deal of voluntary control can help being disturbed and hindered in his progress by it. He naturally thinks of what not to do instead of what to do, and this tends to make him repeat the movements or in attempting to avoid them he makes other and often more serious mistakes. One is sometimes helped by having attention called to errors providing the wrong method is noticed only in order to bring out by contrast the right way of doing. In nearly every case, however, it is much better if possible to direct attention to the thing that should be done instead of to what should not be done. This is especially true of young children who have little power of directing their own attention and of controlling their muscles. There are many wrong or inefficient ways of doing things, and it is natural to try several of these before getting the right one. If a wrong method is repeated, a slight change in the situation may lead to the use of other methods until the right one is adopted. Attention may then be called to this, with advantage. On the other hand, calling the child's attention to the various errors he has made emphasizes those errors and confuses him as he strives to avoid each. The negative act of trying to avoid errors is a wasteful process in learning and

should be performed only where a single type of error has become established as a habit.

MATURITY, LEARNING, AND ABILITY

Spaulding found that chickens that were kept blinded for from one to three days were about as successful in pecking at food as those that had had opportunities for practice. Breed found that if kept blinded five or six days (being fed by putting food in the mouth) they were at first not skillful in getting food, but that they improved so rapidly that at seven days they were equal to normal chickens. Both experimenters interpret the results as meaning that the ability to take food successfully depends in part upon the maturity of the chicken and not wholly upon the amount of practice that he has. Probably the five-days-old chicks were unsuccessful at first because the habit of taking food from the hand had been developed before they had a chance to try to peck it in the usual way. In general, instincts ripen, skill becomes greater, and the animal or child becomes more mature not only when active, but during periods when there is little or no opportunity for learning by practice. This maturity is shown in what is done and in the way in which it is done. Practice may result in more or less rapid learning according to general laws of development favoring or opposing rapid maturity in that line at certain ages and according to the inherited tendencies of the individual.

Some persons are more ready than others in storing up and using the material furnished by experiences, and this constitutes what may be called general mental ability. Again, some persons can deal with certain materials, *e.g.* musical sounds, with much greater facility than can others. This constitutes special endowment, talent, or ability. With exactly the same environment each individual will mature in general and special ability at different rates and ultimately in different degrees, just as people vary in

rate of growth and ultimate size of the body as a whole and in certain parts. In neither case does it follow that the one who matures most rapidly is ultimately further ahead, for changes may continue for a longer time in the other. Either may also change more or less suddenly his rate of maturing. The facts regarding this matter are most clearly seen when we contrast different animals or different races of men, or feeble-minded with normal individuals. A robin matures much earlier than a chicken, but probably does not ultimately become more intelligent; a negro child learns to walk and talk early, but his mental development becomes slower and stops sooner than in the case of whites. A feeble-minded child may seem to be almost the same as normal children till three, seven, nine, or eleven years of age, then have his development almost completely arrested. He may learn some new things of a specific nature, but fails to make any advance in the use of the general results of experience and training. The Binet tests are especially designed to determine the extent or progress of general mental development. They are closely related to, but not necessarily identical with, tests of general mental ability as it may ultimately be revealed.

Brightness or quickness may greatly differ in individuals who are equally mature, hence tests of general ability, which includes brightness, need to be different from tests of maturity. The way in which a child solves a puzzle or defines a word is of great significance in relation to his mental maturity, while the number of solutions or definitions he is capable of in a given time is more significant of his brightness. The rapidity of performance may not even be a true indication of mental quickness if the individual has had some special training in that particular act.

A test in some line in which all the children have had very nearly an equal chance to learn is a better test of general mental maturity and of general mental ability than one that gives opportunity to use special experience and training. The manner

of doing is more significant of the degree of mental maturity, while the amount done is more significant of general mental ability. Of course in many cases speed is increased by more mature methods of working and thinking.

The problem of special mental ability is not easily separated from that of special training. An individual with special musical or mathematical training may seem to have as great or greater special ability of that kind than another with real genius who has had little or no special training. To count these two persons as equal, in planning a vocation for them, would be absurd, yet it is difficult to devise tests that are independent of special opportunities for learning or of special training.

There is another factor in general and special ability which renders it exceedingly difficult to determine by means of tests what the general or special success of an individual will be. Intensity of effort, adaptability, initiative, partly describe this elusive factor. A biologist cannot tell by examining an animal whether he will be likely to survive in a given environment or not, until he knows how he is going to use his special endowments of color, strength, speed, and weapons of defense, and the relations he will establish with his environment. In a new or changing environment a plant or animal will flourish or decline in a way wholly unpredictable, as witness the English sparrow, the brown-tail moth, the grasshopper. Men of all degrees and varieties of native endowment succeed in a given environment and in the same occupation, some by one means and some by another. An important element in intellectual ability is shown in the way in which a man brings to bear, upon the problems confronting him, his native powers, develops some of them, and adapts himself in one way or another to the conditions confronting him. This element in intelligence is most difficult to measure, partly because you never know what an individual will do in this respect until you give him sufficient motive for action, and motive

in man is hard to regulate, and partly because it is hard to give a test that will truly show this general quality, which is also to some extent special by endowment and training. The person who shows great resourcefulness, initiativeness and inventiveness in one line, such as mechanical construction, may show very little in another, such as musical composition or scientific research.

These facts make it difficult to formulate the general laws governing the mental development of man and still harder to predict what an individual who appears to possess certain general and special abilities will do when confronted with new situations. You may estimate from his previous success in school what his future scholastic success will be, with considerable assurance, but it is almost impossible to prophesy his future occupation and success after he leaves school.

It also makes reliable studies of learning processes difficult. Practice at a time when inner conditions are favorable to rapid learning and maturing may produce much greater results than the use of an intrinsically better method at a time when internal conditions are less favorable. An educator who gives each kind of training at the time when inner processes are most favorable to that phase of development may get far better results than one who uses technically better methods with less regard for natural stages of development. This is one of the chief reasons for studying children's interests as indications of conditions favorable to certain kinds of learning. Care must be taken, however, to distinguish the temporary interest of novelty or the more developed interests of apperceptive knowledge and experience from those due to the strengthening and waning of fundamental instincts at the various ages or the unfolding of special inherited talents.

HABITS

Some habits are formed by repeating again and again, in the same way and in response to the same stimulus, movements

which have had favorable results. In a large proportion of cases, however, habits are formed in a different way. Usually there is a period of learning during which stimuli vary and reactions change until after a while a certain phase of the situation which is constant and significant is responded to by the same sort of reaction again and again without much variation. This marks the final stage of learning in which habits are formed and become fixed. Such a stage is, however, not necessarily permanently final so far as performing the complex act is concerned. The tennis player who has learned how to hold and swing the racket and strike the ball in any desired direction acquires after some further practice a pretty definite habit of serving, as his position in standing and his movements in tossing and striking the ball indicate. A change in his racket will modify it only slightly. His position in standing and his strokes in returning the ball will become definitely habitual less soon because the situations vary so much, but after a while he will also have rather characteristic habits of movement in returning balls, according as they are high or low, slow or swift, on the right side or on the left. If he attempts nothing but the moderate direct stroke, these various habits may become well established. If, however, he undertakes cut strokes, every one of these habits will be departed from. New habits may entirely replace the old ones or may be developed in addition to them, and one or the other be used at will. The first effect of the attempt to use the cut stroke is always a falling off in ability to win games. In nearly all complex learning there are one or more periods in which progress ceases and often appears to recede because of changes in the method of performing the act. If the new method is a good one, advance again takes place as soon as facility in its use has been obtained by practice. Very frequently the attempt to change the method, as in changing the stroke in tennis, makes it impossible to use the old method successfully while the new is being

learned. If each method is practiced separately with the definite purpose of using the one method or the other, the interference between the two is less.

The "plateaus" so often found in learning curves are frequently, if not always, due either to variations in interest in the task or to a change in the method of performing some part of it.

As has already been indicated, improvement with practice is marked by the doing away with useless movements and decrease of attention. This is the chief reason why the task becomes easier and one of the principal reasons why the speed of performance is so greatly increased. Another reason for increased rate of work is because, as processes become simplified and mechanical to the individual, other processes may be carried on at the same time. It is due to such overlapping of physical and mental processes that we are able to perform so easily such complex acts as standing erect, holding a book correctly, moving the eyes along the parallel lines of print, pausing to see all that is necessary in order to recognize words and phrases, moving the vocal organs in uttering sounds and giving each the proper emphasis, while thinking of the meaning of the sentences read and perhaps also criticizing the literary style. The perfecting of one habit facilitates the forming of another, and attention which perhaps was formerly wholly occupied with one or the other of the processes is now needed only slightly or occasionally, except for those that have not yet reached the habit stage and been properly grafted on to the others or fused with them.

One of the practical problems in pedagogy is to determine the kind and amount of practice that should be given in learning various useful things, such as writing. How good and how rapid should one's writing be before practice for the purpose of further improvement shall cease? We know that there is a stage beyond which further practice shows little results. A good deal of time is required to reach that stage; and if continued effort is not made

to maintain or raise the standard, there is danger of dropping back. On the other hand, if one stops a little short of his best, then tries to keep his writing nearly the same all the time whatever he may be doing, it is possible to write page after page uniformly and with little or no thought given to the process. This result will be greatly facilitated if the same style of script is used and the same kind of movement employed in all practice. If writing is regarded simply as a means of expressing thought, it is undoubtedly wise to thus make it a fixed habit.

If, on the other hand, permanship is regarded as an art worthy in itself of the highest degree of cultivation, then various styles of writing should be practiced and the forming of fixed habits avoided.

Efficiency demands that anything which needs to be done often should be performed with ease and facility and with only as much elegance as the case requires. If, however, a subject is being taken up for purposes of general development, care should be taken to vary the process in a variety of ways and to postpone the formation of fixed habits which will be likely to interfere with further development. One who is to perform day after day a certain kind of mathematical calculation may, for purposes of efficiency and of economy of time, learn and practice one method only of solving such problems; while the person who wishes to develop his mathematical powers could more profitably study fundamental principles and receive some practice in various methods of solving problems of the same type.

GENERAL AND SPECIAL TRAINING

The organism is a unit and the vigor of activity of even the smallest part depends to some extent upon the condition of the whole body and especially upon the action of the vital organs. The reverse of this statement is that the activity of any part of the body affects other parts of the body, especially those of general

vital significance. Exercising one arm modifies the breathing and the heart beat, while the amount and quality of the blood flowing to different parts of the body are changed. The effects upon corresponding parts of the body are greater than upon non-corresponding parts. For example, the left arm may be increased in size by exercising the right arm more than can the legs by such exercise.

The nervous system is of especial importance in spreading the effects of activity to other parts. Experiments show that if an auditory stimulus is given at just the right interval before the touch stimulus of striking the leg just below the knee cap, the reflex movement of the foot will be increased.

It is evident that continued activity of any part of the body not only develops that part, but other parts whose activity is indirectly increased by the practice. The reverse also holds true. If the activity of one part of the body decreases activity in some other part, the practice which develops one part may inhibit the development of another. The effects of practice are therefore (1) local, affecting the parts exercised; (2) diffused and special in so far as other particular activities are changed; and (3) general, in so far as vital processes concerned in all activity are affected. A bicycle rider develops especially the muscles of his lower limbs and to some extent special muscles in other parts of the body. The rower develops especially the muscles of the shoulders and back, while both develop the muscles controlling the lungs, those of the heart, and of other vital organs. There is also specialized and general development of brain centers in both cases. If the bicyclist turns to foot racing, he will be better prepared for success than if he had not ridden a bicycle, because his vital organs will be better developed and some of the muscles of his legs will be stronger. In a similar way the rower will be better prepared for hammer throwing by his previous practice in rowing. Both have some preparation for football because of

general increase in vitality and increased strength of some of the muscles to be used. Neither would be materially helped by the special technique that he had developed by his previous practice.

Special skill and efficiency, as we have already seen, result from the limiting of varied movements to a few useful ones accurately made. The farther this process is carried the greater the efficiency in the specialized task, but the less are the effects upon the vital organs and upon other parts of the body which are no longer active to any considerable extent as skill is attained. Persons engaged in physical training usually take varied exercise as well as specialized practice in order that general vitality may be maintained and increased and in order that a better balance in the development of parts of the body may be secured. Even those who care only for winning in a certain kind of an athletic event follow this plan, while those who are concerned for general physical development rather than for specialized skill in one line, give much more attention to general development than to specialized practice. It is clear from the above that the early stages of practice in which the activity is diffused have more general effects than the later stages in which special habits of technique are formed. The special habits developed in one kind of exercise may not only fail to help in doing something else, but may interfere with success at least for a time. The football player who has learned to hold the ball tight against his body and run with it, has some trouble in learning to pass it as soon as he gets it in playing basket ball; and the tennis player when playing hand ball at first finds it hard to strike with the hand instead of with the racket. In both cases, however, the previous practice in passing and placing balls helps specifically in the new game. Although every exercise produces general effects, it is evident that some produce more effects than others upon the vital organs, whose improvement increases the efficiency of

all parts, and some exercises provide a better preparation for one occupation than for another.

There is every reason to believe that these same principles hold with regard to cerebral and associational mental activity. There are differences in mental vigor just as there are in physical, and every special mental activity has associated and general as well as local effects. Practice in solving problems in mathematics, science, or language not only increases one's ability to solve those particular problems and similar ones, but adds something to the power to perform any mental task, or, in other words, to general mental power. Further, the practice in dealing with language problems in one language may be of more help in studying other languages than in scientific research.

The old doctrine of mental discipline founded upon the false idea of special faculties, which assumes that all acts of memory are alike and similarly those of perception, reasoning, etc., is admittedly absurd. The new idea of mental discipline based on the truths of physiology and psychology is yet to be worked out scientifically. There is every reason to believe, however, that there are general and special powers of the mind which may be increased by exercise of special kinds, some exercises being more effective than others for general and special purposes. Just what kinds of study produce most general effects and just which kinds are the best preparation for success in a particular line, must be determined by experience and experiment. It is, however, evident that the acquisition of specific forms of knowledge and mental ability must have more general effects than the practice in using them after special habits have been developed and the activity has become more restricted.

FATIGUE IN LEARNING

The process of learning is closely related to that of fatigue. Some fatigue in the sense of liberating energy through the using

up of the portions of the body that are active is preliminary to the process of building a reorganized tissue which shall permanently retain the effects of the practice. On the other hand, if a very definite act is performed many times until the most readily decomposed materials of the tissues involved have been used up, there is a condition known as fatigue which is due in part to the clogging and poisonous effects of the production of waste material during activity, more rapidly than it can be removed by the circulation of blood in the part. This fatigue may be shown by decreased vigor and rapidity of working, but is more often shown by irregular activity or by the bringing of other parts into action.

If one is required to tap with his finger until he becomes fatigued, there is some irregularity in rate and manner of moving, then a change in the way of tapping whereby the muscles of the forearm or whole arm are used instead of those of the finger. If the other fingers are kept on the table so that this cannot be done and a strong effort is made to keep the finger moving as rapidly as ever, other muscles will be brought into action, such as those of the jaw in setting the teeth, or of the brow in frowning, or of the other hand in clenching the fist, as strong effort is put forth. In other words the change is from accurate movement of a few muscles to movements that are more indefinite and futile in attaining the end, a change which parallels in an almost inverse way the changes that take place in learning.

A person of determination may continue by force of will to perform his tasks after he has become fatigued, but in doing so he expends much energy in making useless movements. As a consequence he may experience general fatigue as well as special fatigue of the parts usefully employed. In this fact that general fatigue is produced not only by general exercise but by prolonged and excessive activity of a few muscles, we have another parallel of what takes place in general and special development.

It may be admitted that the effort of working when fatigued may have some disciplinary results in that various parts of the body are forced into activity. On the other hand it is still clearer that if diffused and useless movements follow when fatigue begins, the process of learning in the sense of improvement in the doing must be reversed. Clear evidence of this was found by Professor Book in his experiments upon learning to typewrite. A beginner writes at first by letters, later by words, and still later by clauses and sentences. If one who was in the word stage of writing practiced when fatigued, he never advanced while thus practicing to the clause stage, but he was very likely to drop back into the less rapid and efficient letter stage of writing. A habit that is pretty well formed may be maintained while practicing when fatigued, but learning in the sense of progressing into a more efficient method of working is not possible. It seems, then, that in the earlier stages of learning anything, practicing when fatigued not only does not advance one, but is very likely to retard him. If one practices only when he is tired, he is almost sure to form crude and inefficient habits of doing the thing which if long used are hard to break. It follows from this that if one must work when tired it should not be at tasks in which the best method of performance is yet to be learned. This has much the same basis as the familiar rule that difficult tasks should be undertaken when one is fresh and vigorous.

Just as special technique gained in one line has little effect upon other kinds of technique or general power, so does local fatigue (not prolonged until it becomes general) have little effect upon fatigue of other parts or upon general fatigue. Rest may therefore be obtained from one kind of activity by engaging in another. Again, just as some kinds of learning prepare for others, so some kinds of fatigue are best relieved by certain other kinds of activity. A person who is experiencing general fatigue is in an entirely different state from one who is locally

fatigued, just as a person of general vigor differs from one who has little vitality but a great deal of technical skill of some kind.

The relations between learning and fatigue are such that from the standpoint of science, investigations as to the effects of fatigue produced by a certain kind of activity upon other special parts of the body and upon the vitality as a whole, will help in determining the effects of one kind of practice upon other activities and for general ability. On the practical side it is probable that of two men doing the same work, the one who so arranges his periods of work and his rest and recreation periods and who works in such a way as to become least fatigued, will have gained most general discipline and development.

The phenomena of fatigue complicate some of the studies of learning processes. There is usually a "warming up" stage at the beginning of practice, due probably to increased circulation in the active parts; then in the latter part of a period of practice, fatigue may counteract some of the practice effects. Again, fatigue is more or less rhythmical, which is analogous to the plateaus in learning and may sometimes be partially responsible for them.

Exercises for Students

1. Give examples of persons in the same environment being affected by different phases of their environment and developing in different ways.
2. Study and describe the early learning of some animal or child.
3. Report instances observed in which adults learn largely by trial and success; or set them to solve puzzles and note the method used; *e.g.*, put a penny on a card and balance it on the finger, then knock the card out, leaving the penny.
4. Discuss the relative advantages of children learning games, music, arithmetic, or geography by actual experiences, imitative or chance, and by imaginative experience or by learning symbols or rules.
5. Report observations as to the relative advantages of short or long periods of practice and of longer or shorter intervals between practice periods.

6. Study in detail the processes by which efficiency has been gained in some line and report the main facts as to progress and as to what helped or hindered.

7. Give examples of the influence of maturing upon interest and the rate of learning.

8. Give examples of habits of your own or others that are below one's limit of performance and state why it would or would not pay to change them and develop others closer to the limit of possible performance.

9. Give examples showing that special practice gives general results.

10. Give specific instances of acts that may be performed when fatigued and of those that should not be, giving reasons.

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CHAPTER VI

THE EARLY DEVELOPMENT OF THE HUMAN INFANT

EARLY MOVEMENTS

THE human infant is a very helpless being. This is in accordance with the general law that young animals have just enough power of movement so that when their instincts are supplemented by those of their parents, they are able to live.

The *automatic* movements of independent respiration, circulation, and digestion begin as soon as the child is born.

At or soon after birth, *reflex* movements may be called forth by stimulating any of the senses, and most of these reflexes, such as closing the eye when the lid is touched, pushing out with the tongue unfavorable objects, and withdrawing a hand or foot that is painfully stimulated, are, from the first, useful; while others, such as clasping with toes and fingers an object touching them, were probably at one time in the race history useful in helping the mother to carry the child.

The *instinctive* movements are not well developed since human parents are prepared to do almost everything except breathe and digest for the child. Even the necessary and important instinct of sucking is sometimes not well performed at first. Usually, however, it is. A strong infant held in a certain position and lightly touched on the cheek will, when hungry, also make movements of the head favorable to the finding of the source of nourishment. There is also in strong infants early evidence of rudimentary attempts at maintaining equilibrium of head, and a little later of body also.

The expressive mechanism for crying is well developed from the first, because this is needed to call the parents to relieve unfavorable conditions; while smiling and laughing do not appear till much later, because such movements are of little biological value at this time. Later when the parental instincts of the parents tend to decrease, such pleasing acts are doubtless helpful in securing continued care and protection.

Starting at sudden sounds, especially when they are accompanied by a jar (as the sound of the slamming of a door), is very marked. This is perhaps the first evidence of a general instinctive fear of strange and strong stimuli. A more specialized reaction which was perhaps useful in an earlier period of race history is shown in the tendency, beginning in the first month and lasting several weeks, to shrink together and clasp as if afraid of falling, when lowered suddenly. Sometimes when clothes are removed so that there is lack of their supporting contact with most of the body, the same instinctive fear is manifested.

The tendency to bring the hands to the mouth, so prominent almost from the first, may be the result either of the habitual inter-uterine position, or of an instinct which was useful in the earlier history of the race. The tendency is certainly very helpful to the child in obtaining touch sensations, since objects are by this movement brought to the mouth for closer examination by tongue and lips.

Since ability to use the sense organs is useful to the child, we find a partially developed reflex tendency to do so. The eyes close at a touch upon them or the skin near them, but not until later at the visual stimulus of a threatened blow. Experience is perhaps necessary to develop this reflex. Turning the head to hear and moving the fingers to get clear touch sensations are probably only partially mature reflexes. Movements of taste organs are native, while snuffing for odors is late in develop-

ment. Before the beginning of the second quarter, however, the eyes close at a threatened blow, move together, fixate, and follow moving objects; while a little later there is an accurate turning of the head toward the source of sound, and also a marked tendency to use the skin of lips, fingers, and toes in getting sensations of touch.

From the first, the infant makes numerous spontaneous and random movements of almost every part of the body, independently of external stimuli. These movements, resulting from organic conditions, growth changes, and the consequent outflow of energy, are important means of developing the muscles and preparing by variety of experience for the voluntary control of the muscles thus exercised.

INCREASE IN CONNECTION BETWEEN MOVEMENTS

During the first few weeks the movements of an infant seem to depend more upon general bodily conditions than upon outward stimulation of any of the special senses, and the movements of the different parts of the body seem to have little relation to each other. Soon, however, outward and special stimuli become more effective, so that crying and restless movements, due to bodily condition, may frequently be checked by auditory, tactual, or visual stimulations, such as singing, patting the child, or shaking something before his eyes.

In the second quarter, many combinations of movement take place. The eyes not only turn toward and follow a moving object, but turn toward a sound or toward a portion of the body that is touched, thus bringing more than one sense into action and associating the resulting sensations. The lips, hands, and often the feet also, not only move when touched, but move into contact with objects seen, which are then tested by other tactile surfaces and perhaps by eye and ear. In the meantime, the first reactions against the tipping of head or body have developed,

so that equilibrium is maintained against the tendency of head and body to move out of balance. Not only this, but equilibrium is maintained while grasping, and head and body usually move with the hand in reaching for an object. The movements of different parts of the body are therefore no longer independent of each other, but very closely connected. Fixed, mental associations of sensations and movements are thus early formed.

In this and the next quarter a new kind of movement becomes very prominent. Random and meaningless movements of parts of the body change to those repeated rhythmic and partially coördinated movements of various muscle groups which we designate as play. Certain movements of limbs or vocal organs are produced over and over for several days, then a new one is practiced for a while. Various combinations of movements are made, and the muscles and the senses are thus exercised and associated in countless ways, as the child amuses himself.

In the latter part of the first year not only are movements, previously made, repeated in play, but movements seen and sounds heard are often playfully imitated and repeated over and over.

The process of combination goes still further, and the child begins to move toward things by crawling or otherwise, or to stand, holding with one hand and reaching with the other, and at about a year to maintain equilibrium while standing and walking, and in getting up and down when he grasps something on the floor.

Looked at in a purely objective way, the most marked change in the movements of a child during the first year is, therefore, not in number, but in complexity, coördination, and definiteness. From the use of one sense and one or two groups of muscles at a time, the child has progressed to the combined use of muscles of legs, body, arms, fingers, head, and eyes, in getting objects and obtaining visual, tactual, and auditory sensations from

them. The early movements were mostly unconnected and uncoördinated, and ended in nothing but movement; while at the close of the first year they are combined and correlated with each other, and attain the end of changing the position of the child or of some object. These changes toward more complex and unified movement are doubtless preparatory to, and correlated with, corresponding changes in the conscious states of the child.

EARLY MENTAL STATES

"What is the baby thinking about?" is one of the most fascinating and puzzling of questions. Sympathetic imagination endows him with a thousand adult feelings and ideas, or dimly remembered childish states. Yet no one can represent the baby's ideas except in terms of his *own* present or former mental states. The important epoch included in the first year or two of life, to which the memory of men goeth not back, cannot therefore be pictured in its true colors by the most gifted child lover.

The scientist is almost equally impotent in attempting to discover and describe the real mental states of an infant. He is perhaps strongest on the negative side; for, reasoning from general principles, he can say with considerable assurance what is *not* in the baby's mind, just as he can affirm that a planet without atmosphere has no animal life like our own, or that in a certain age in the world's history there could have been no animal life of a certain kind because it was too hot or too cold, or because there was an absence of appropriate food. When, therefore, the psychologist finds that the greater part of the cortex of the brain (which there is good reason to believe is the seat of consciousness) is not active during the first three months of life, and when he observes that nearly everything that the child does is sometimes done equally well, or even better, when asleep than when awake, and that in children born without a brain the movements are nearly the same as in normal children,

and when he remembers that the child cannot have any knowledge gained from experience that the adult has, he is warranted in saying that there is nothing in the young infant's mind sufficiently like what is in the adult's mind to warrant the use of the same terms. If he makes any positive suggestion as to the child's mental states, he will say that if there is any consciousness at first, it is most like, yet much more indefinite than, the vague feelings, almost without ideas, that are sometimes experienced by adults when in a drowsy state.

The child sleeps most of the time at first, and is probably conscious of only the more intense stimuli. The field of consciousness, soon to become a fairyland of new experiences, is at first a half-formed, barren desert, with only an occasional rock of bodily pain or oasis of comfort clearly discernible.

Since the only key to the mind of the young child, who cannot speak for himself, by which his movements may be interpreted, is a mental state like his own at the time of making the movements, the door to his inner mental states is forever closed to adults. To us every sensation has a meaning; it is related to and calls up sensations like it or associated with it in past experience. The infant, however, has no such past experience as we have and even when its movements are significant, the various sensations are not related to each other, but merely each to its appropriate, separate reflex. The first sound heard carries with it no suggestion of sounds of its class, or of an object to be seen or touched. It is probably only a more vivid something in the mild chaos of organic and movement sensations.

The child is at first simply a wonderful mechanism whose parts are not all finished or connected, beginning to feel and become conscious of what it does. It is distinctly conscious of only the more intense or newer things that it does, and learns how things are done only after it has done them a number of times. Consciousness probably has no influence whatever upon

action for several months, but gives merely an imperfect report of what is being and has been done -- a log book of the first voyage of the vessel of life, in which appear only the regular food watches and the unusual events of the voyage.

It is probable that there is very little unified consciousness during the first quarter; but in the second quarter, when movement becomes more complex, so that the stimulations of one sense are connected with those of another, consciousness probably becomes unified in a corresponding degree, and every experience becomes associated with others like or contiguous to it. Every sensation soon has a background of general bodily sensation and a fringe of past sensations. As consciousness thus becomes unified and related, it begins to assume its rightful place as general director of affairs, and chooses that certain agreeable experiences shall be continued or repeated, and, a little later, exercises some influence in determining how this shall be done.

Thus does the semiconscious and utterly helpless being acquire a definite and unified consciousness, and gradually take possession of its developing self. The functioning of reflex and instinctive mechanisms that are perfect at birth, and of other mechanisms after they become perfect, has little influence on the conscious self. *The processes of perfecting mechanisms, developing them for new purposes, and combining them in various ways, are the chief exciters of conscious activity, and the means by which the mental self grows.* Every new experience illuminates and enlarges the field of consciousness, and extends the control of the growing self.

DEVELOPMENT OF VOLUNTARY CONTROL

In the acquisition of voluntary control over various portions of the body there are most interesting combinations of motor and mental processes. To understand them we must consider the ends gained by movements, both objectively and subjectively.

Many, but not all, reflex and instinctive movements accomplish definite ends, while spontaneous and random movements occasionally do so. Every voluntary movement must have a purpose; but the fact that some objective end is gained does not make it voluntary. To be voluntary there must be some idea of the end previous to the act by which it is gained. In complex volitions there is consciousness of several ends, or several means of attaining ends, and a choice as to which shall be secured or used.

It is evident, therefore, that voluntary efforts can be made only after considerable experience in non-voluntary movements, which gives a basis for forecasting the possible and probable results of movements in response to familiar stimuli. The muscular and nervous mechanism is, in part, the same, whether a motion is voluntary or involuntary; but in one case the results are anticipated and perhaps chosen from among several possibilities, while in the other they are not. Whether will is an actual force in consciousness or only the resultant of the various tendencies to action, it is at any rate a new state of consciousness, and an utterly impossible one to a young child whose motions consist only of separate random and reflex movements.

The first anticipation of the results of movements probably arises in connection with movements of the head in search of the nipple, and the next, in turning the eyes toward a moving object or an object in peripheral vision. Such movements, however, do not lead directly to the more complex acts of voluntary control, as do those of the limbs. They are so simple and reflex in character that unless the process is interfered with or delayed, there is little consciousness of any kind, and certainly no choice of movement or of end. The hand, however, can move in so many ways, each differing in character and difficulty, and for so many different ends, that consciousness of hand movements readily becomes intense, anticipatory, directive, effortful,

selective, and hence voluntary. The acquiring of voluntary control of the hand is therefore a good type of all volitional progress. The way in which this takes place may best be indicated by notes on how the author's own little girl learned to grasp objects.

"*Sixty-first* day, noticed her own hand and looked at it for a number of seconds. *Seventy-third* day, put hand in her mother's mouth several times, her eyes being fixed on her mother's face, and her other hand nearly still. Her hand often went higher or lower or to one side, but the movement was successful and seemed to be called forth by the object in that position. *Eighty-first* day, held a book placed in her hands and looked at it for some time. *One hundred and eleventh* day, movements of scratching and pulling at things her hands touched became frequent, and there were some instances of reaching toward and scratching at objects, such as a magazine held before her. Also scratched at tablecloth and at a plate, and when her hand slipped off and came to her mouth, she uttered a dissatisfied grunt as if disappointed in not getting what she expected in the way of tactile sensation on the lips.

"When lying on a lounge, has often got her hand against a curtain, grasped and shaken it back and forth for a long time. *One hundred and twelfth* day, got her fingers caught in a ribbon tied around the curtain and jerked at it till it came loose, and finally got it in her mouth. Later in the day drew her father's thumb into her mouth. He removed it, and she succeeded several times in getting hold of it and bringing it to her mouth. When not successful, gave a fretful cry, but renewed the effort. Sometimes her hand slipped over the thumb and came into her mouth, and she seemed disappointed and tried again. This seemed like a clear case of voluntary movement, though of the simplest kind, since there was probably a representation of the end to produce expectation of a certain tactile sensation and

cause signs of disappointment and renewed effort when she got a different sensation.

"*One hundred and thirteenth* day, repeatedly put her father's finger in her mouth, having no difficulty in doing so after she got hold of it. She was not, however, always successful in getting hold of it, sometimes one or two fingers clasped it and sometimes all slipped past. *One hundred and fourteenth* day, reached the finger several times without trying to put it in her mouth. *One hundred and nineteenth* day, carried watch to her mouth a number of times, used both hands most of the time, sometimes merely getting them behind the watch and pushing it, at other times clasping it with one or more fingers. The arms are controlled, but the fingers show little more than the original reflex. Head usually moved toward objects before and while reaching for them.

"*One hundred and twenty-ninth* day, control of fingers not perceptibly better. She uses both hands when object is directly in front, and the nearest hand when it is on one side. Reached for watch four or five inches beyond reach, but not as certain to try as when closer. Slipped her fingers along her mother's when her own instead of her mother's fingers touched her lips. This may have been accidentally successful, but it showed dissatisfaction is not getting the desired sensation. *One hundred and thirty-second* day, seemed to be reaching behind the mirror for the face. *One hundred and thirty-fourth* day, can move her hands with considerable accuracy and rapidity within a small space directly in front of her, and in that space generally uses both hands. When the object is on one side, she generally uses the hand on that side. Has little control in reaching up high or down low.

"*One hundred and fifty-first* day, tried to grasp nearly everything within reach, and seems to be more accurate when she does it very quickly than when she reaches slowly. *One hundred and fifty-third* day, spent some time in catching a swinging watch

and letting it go. Reached for it only when it was near, and naturally was more frequently successful when it was swinging toward her than when it was swinging out. *One hundred and sixty-eighth* day, has now sufficient control of her movements so that toys give more pleasure than vexation. *One hundred and seventy-first* day, persistently reached for a red bow, though it was nearly or quite hidden from view part of the time. *One hundred and seventy-fifth* day, does not keep things in her mouth so much, and apparently shakes the rattle not simply for the movement, but also for the sound, though this is not certain. Often grasps things very quickly.

"*One hundred and eighty-second* day, can now grasp and hold in one hand a ball an inch or more in diameter. *Two hundred and second* day, has been able to take a handkerchief off her head for some time, and to-day succeeded a number of times in taking a stiff hat off her head, having difficulty only when she took hold too far forward and pulled it against the back of her head before getting it high enough. *Two hundred and thirteenth* day, if anything is held just out of reach in front or over her head, she will try one hand awhile, then the other, then give a discontented cry and try again. *Two hundred and fourteenth* day, took hold of her father's mustache and drew his mouth down to hers, but drew back when she felt the prick of the mustache. This was repeated several times, but the last time she did not bring his mouth down quite close to hers. *Two hundred and fifteenth* day, pulled her father's mouth down toward hers, but not closer than three inches.

"*Two hundred and seventeenth* day, looked intently at a bell as she struck it repeatedly, evidently associating sight, sound, and motion. *Two hundred and thirty-fourth* day, reached with one hand, then the other, a dozen times for toys held just up out of reach before stopping to protest angrily. *Two hundred and thirty-sixth* day, reached for tassels on her carriage, when she

could not see them, and sometimes cried when some one approached to remove them as had been done before."

Summing up these facts, it is clear that in obtaining voluntary control of the hand in grasping, various non-voluntary movements are grouped together and repeated until they can readily be continued in various ways. These combinations are produced at first in response to the stimulus of some object which calls forth various movements, one of which has desirable results. At first the effective stimulus is some visual object and the desired result a tactile sensation on the lips. Soon representation of the result is sufficiently clear to produce disappointment when it is not obtained, and the attempt is repeated. The act then has the essential characteristics of a voluntary movement. This usually occurs between four and five months, while a month or two later there is shown the more complex voluntary state of representing the exciting stimulus, as well as the end to be secured, as when the child reaches for what is not in sight. At about the same time the end to be gained is often changed to tactile sensations on the hand instead of on the lips, or to muscular sensations as the hand is moved, or auditory sensations as the object is made to strike something else. When a movement is stopped because the consequence has proved disagreeable (as when the mustache was brought to the lips), we have a further complication of movement being checked by the idea of undesirable consequences.

The muscles of the limbs first brought under control are the larger ones of the whole arm, while the space in which control is first exercised is directly in front and near the level of the mouth.

Other movements than those of the hand come under voluntary control in a similar way; first the eyes and head in turning toward sights and sounds, then the body in sitting, then the hands in grasping, and finally, near the close of the first year, the legs in creeping, standing, and walking, and the vocal organs in repeating

sounds. The first of these is so largely provided for by inherited mechanisms that the movements soon come under the possible control of consciousness, while the last involves the coördination of so many simpler non-voluntary movements that the whole series is often looked upon as acquired by experience.

A careful study of this early development of control of the hand and of other parts of the body shows it to be general as well as special. Not only does the child learn to make specific movements in getting specific objects in a certain position but he gains the power to adapt the movements of the hand and of other parts of the body to new objects in any position. Any significant variation in the visual sensation of the position of the object results in a similar variation in the movements of the hand in getting it. This relation may be specific, but its effect gives at least the appearance of general free control of hand movements. There is reason to believe that this relation between visual spatial sensations and movements of the limbs is not wholly acquired, but partly native or instinctive. In young chickens, colts, and calves the power to touch or avoid objects seen in a certain position is well developed soon after birth. In children it develops more slowly, but there is clear evidence that movement toward an attractive object is partially instinctive and not wholly acquired.

Since right-handedness and left-handedness appear in some instances to be clearly hereditary, there must also be some hereditary relation between visual sensations and hand movements. It is claimed by some that left-handedness is really left-eyedness. However this may be, there must be some kind of inherited relation between visual sensations of space relations and movements in space. If this is true by heredity, much more is it true of the species that there are native relations between visual sensations and certain muscle groups. The same is probably the case as regards auditory sensations and the movements of

the vocal organs. These relations, native and acquired, greatly facilitate imitation and the learning of new movements. By directing the eye and the attention properly, we learn to guide a bicycle, draw a picture, or hit a ball.

Most children are probably only slightly right-handed or left-handed and may learn to be either or both; but a few are so definitely of one or the other type that the attempt to change them results unfortunately. In general it is more convenient to be right-handed; hence, only when the tendency to left-handedness is strong should the child be allowed to develop in that way. Where the left-handed tendency is very strong, attempts to change often result in permanent awkwardness and sometimes, it is claimed, in mental retardation and confusion. Ambidexterity is sometimes wisely developed by some individuals.

LEARNING TO WALK

The tendency to locomotion, though primarily developed in the race as a means of nutrition and escape, is fostered in the individual child more by the instinct of curiosity or the desire for the sensations to be obtained by coming in contact with various objects, than by the desire for food and escape.

The fact that children are a long while learning to walk, and that various movements such as rolling, crawling on stomach, or on hands and feet, hitching along in some form of sitting position, pushing one's self backward, or rapid running from one support to another, may be used as means of approaching objects, before the child attempts ordinary walking, seems to indicate that there is in human beings no instinctive mechanism for walking as there is in the case of chickens or pigs, which can walk almost perfectly from the first.

On the other hand, the fact that the walking reflex (the tendency to move one foot forward when the other touches the floor, develops in the first or second quarter, and that the rudimentary

tendency to maintain equilibrium appears even earlier, shows that part of the mechanism of walking is in working order at an early date. Walking becomes possible when its reflex elements can be properly combined. Such an instance as the following shows that the whole mechanism for walking may be developed and its parts connected without experience, and that consciousness may hinder rather than help, all of which indicates that walking in children is more instinctive than is usually supposed.

The instance is thus described by the father, Superintendent Hall, of North Adams, Mass.

"In reply to yours of March 25th, I give you the following account of how my little daughter Katherine learned to walk. She was the youngest of a family of five. The other children had learned to walk soon after they were a year old, and in the normal fashion — by being encouraged to put forth a series of efforts until they were able to go alone. Katherine was a normal child in other respects, bright, active, and healthy, yet unable to walk a step when she was seventeen months old. Of course we were anxious, fearing the cause of this inefficiency might be physical, especially as she persisted in crawling and absolutely refused to try to help herself under the encouragement of any assistance.

"At last we referred the matter to a physician, who said: 'It is a peculiar case, and I can hardly tell whether the difficulty is physical or mental. If there is no improvement in a short time, call me again.' Shortly afterward I came home one day at noon, and placing my cuffs on a table in the sitting room threw myself on a lounge to rest. Katherine happened to notice the cuffs from where she sat on the floor, and crawling across the room pulled herself up by one leg of the table, and reaching out with one hand, while she held on to the table with the other, took a cuff off from the table and slipped it on over her wrist. Of course

to do this she had to stand alone. I noticed it at once and was surprised when she reached out her other hand for the other cuff and slipped that on, and then stood looking in a very interested way at the cuffs on both wrists. Then, to our great surprise, she turned toward me with a very pleased expression on her face and walked as confidently and easily as any child could. Not only this, but she immediately ran across the room, through another room, and around through the hallway, not simply walking, but running as rapidly as a child four or five years of age would. What surprised us most was that she did not seem to be wearied by her effort at all.

"We allowed her to keep the cuffs on for ten minutes or more, and she was on her feet all the time. At last she sat down a moment, rested, and then, strange to say, got up on both feet without assistance, and commenced to run around the room again. As an experiment I took the cuffs off, and she was as unwilling to try to walk as before. We could not possibly induce her to take a single step without the cuffs. When, however, we allowed her to put them on, she seemed to be greatly delighted and walked and ran as before. The result was that I gave her an old pair of cuffs and allowed her to wear them for two days. This was the only way we could keep her from crawling. After that time she seemed to be able to get along without the cuffs, and has not crawled any since."

Since publishing this account many similar cases have been reported to the author.

Learning to walk is a good illustration of instincts not perfected at birth by definite connections between inner conditions and movements of special muscles. There is an inner impulse to approach attractive objects and those which have been found by experience to be enjoyable, and this impulse results in a variety of movements which, according to circumstances and age, cause the child to move toward the object by crawling, creeping,

rolling over and over, hitching along, or walking. A child who is not allowed to sit or lie on the floor between the ages of seven and fourteen months is not likely to learn to creep. Children who learn to creep do not continue to do so, but later walk instead. The combination of an end to be gained by moving the whole body, with instinctive movements of various kinds combined in various ways by the more or less chance conditions of position of the child's body and limbs and the direction of the attractive object, result at one age in one kind of locomotion, and at another in a different one. The mode of locomotion fittest for the time being continues until a more suitable one develops. Walking is usually later in developing than creeping, because it is possible only after more of the sensory and motor apparatus concerned have matured and become connected in the right way. Just how much the maturing of nerve and muscle apparatus is independent of exercise and how much dependent upon it we do not know. Neither do we know to what extent the tendency to the right combination of the various parts necessary to walking is the result of learning by chance experiences.

RELATION OF INSTINCTS TO MENTAL ACTIVITIES

The chief difference between a man and a photographic plate is that man has active instincts which impel him to do something else besides receive and reproduce impressions. Of course he responds to a much greater variety of stimuli than does any other creature; but the chief point is that he is not passive, but reaches out into the world for stimuli and responds to them in many self-determinate ways.

A child not only registers the existence of food when it appears before him as would a photographic plate, but the feeding instinct impels him to seek food and to take it; while the instincts of curiosity and of fear impel him to examine new objects closely before touching them. If another child seizes the food, the in-

stinct of anger may impel the first one to attack the offender, but the instinct of fear or the desire for his mother's approbation may restrain him. If the child is not hungry and is good natured, the play impulse may in a similar instance cause him to engage in a friendly tussle and chase to secure what neither of them cares particularly for except as an object of competition. Thus do instincts impel to action without always providing the specific apparatus for a definite form of movement suited to satisfying the impulse. In man the external movements are less definitely provided for than in animals and the instinctive impulse in him often leads to feelings and ideas followed by movements remotely connected with the original instinctive impulse.

The chief differences in a human being at different stages of development are due not merely to experience, but to various instincts which are present or prominent at different periods of life.

As we have already seen, impulsive movements are the basis of voluntary control, since by no possibility can the mind know how to make a motion or what will be the result until the motion has been made and the result experienced. The different ways in which a child responds to the various stimuli that he receives are important means of distinguishing one sensation from another, and the chief means of associating them in certain ways; hence, our intellectual life is based ultimately upon our reflex and instinctive movements. The emotions of a child also depend upon the ways in which he reacts to various objects, the modes of expression used, and the internal bodily changes that occur. His emotions are therefore largely the consciousness of his own reactions to his surroundings. It is just as impossible to experience an emotion previous to its corresponding instinctive impulse as it is to voluntarily make a particular movement that has never before been made. Nothing surprises us so much as new emotions that suddenly come into our lives, as novelists have often

shown in one sphere of instinctive development. The silking of growing corn is not more entirely determined by the laws of organic development than is the emotion of love in the youth, by the emergence of a new instinct from the depths of his unconscious nature.

In the higher forms of action, involving not merely control of movement but complex ideas and feelings, emotions seem to be the conscious determinants of action. Instinct and habits, however, really determine what feelings shall be experienced under present conditions and render possible the picturing of the feelings which may be experienced through proposed actions.

Intellectual activity is excited by curiosity and made prominent in finding the means of securing the satisfaction of desires. Our whole mental life, intellectual, emotional, and volitional, is developed in connection with instinctive action. All activities of the conscious life have for their root unconscious, blind, instinctive tendencies.

In our further study of instincts and their development, therefore, we are really studying the fundamental yet unrecognized basis of all emotional, intellectual, and volitional development.

Exercises for Students

1. Report observations or printed records of the early reflex and instinctive movements of infants.

2. Describe instances of an infant of less than a year using many parts of the body in a coördinate way for a single end.

3. Mention several specific movements of an infant less than six months old, and give reasons for thinking them either unconscious, conscious, or voluntary.

4. Report early instances of volition observed by yourself or found in reading.

5. Report from observation, hearsay, or reading as fully as you can how one child learned to walk.

6. Report from observation or reading instances of animals learning by the "trial and success method."

7. Give illustrations of the three methods of learning in the case of persons. Name two or three things that may best be learned by the "trial and success method," by the "imitation method," and by the "method of understanding," indicating in each case whether the age of the person makes any difference as to the prominence of the preferred method.

8. By which method should children learn to sing?

9. May we expect a child to know how to control a new feeling? Why?

10. Should we strive to control a child's actions by his feelings or his feelings by his actions? Why?

11. Is it better to do a kind act for a child or let him do one for you? Why?

Suggestions for Reading

On the general subject of infant development, read Preyer, Moore, Shinn, Tracy, Compayre, Vol. I, and the following articles: G. S. Hall, *Ped. Sem.*, Vol. I, pp. 127–138; Mrs. W. S. Hall, *Ch. S. Mo.*, Vol. II, pp. 330–342, 458–473, 522–537, 586–608; Darwin, *Pop. Sci. Mo.*, Vol. LVII, pp. 197–205.

On the development of voluntary control and learning to walk, see Spence, *Pop. Sci. Mo.*, Vol. XIII, p. 444; Kirkpatrick, *Psych. Rev.*, Vol. VI, pp. 275–281; Baldwin, *Science*, Vol. XVII, O. S., p. 113, or *Pop. Sci. Mo.*, Vol. XLIV, p. 606, and *Science*, Vol. XX, O. S., p. 286, or *Mental Development*, Vol. I, pp. 47–103, 367–430; Dexter, *Ed. Rev.*, Vol. XXIII, pp. 81–91; Judd, *Genetic Psychology*, chap. vi; Trettein, *Am. Jr. Psych.*, Vol. XII, pp. 1–57; Compayre, Vol. II, chap. iv.

On relation of instincts and emotions, see James, *Psychology*, chapter on "Emotions," and Ribot, *Psychology of the Emotions*, chap. vii; Baldwin, Vol. II, pp. 185–220.

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CHAPTER VII

DEVELOPMENT OF THE INDIVIDUALISTIC INSTINCT

STRENGTH OF THE INSTINCT

THE usages of polite society all tend to suppress and cover up this instinct, but it remains as a powerful underlying force, directing the feelings, thoughts, and actions of men and women. In times of excitement it bursts into view in a most surprising way. In a moment, a company of courteous ladies and gentlemen, apparently intent only on giving each other pleasure, may be transformed into a pack of wild beasts, struggling and trampling under foot their helpless companions in the effort to escape from a burning building.

Even when reflective consciousness has attained to the view that life is not worth living, and decides upon suicide, a sudden change in conditions will arouse the all-powerful instinct to live; and the individual then struggles for life as frantically as if it were the most desirable of all things. For example, a Frenchman who was on his way to drown himself, promptly climbed a lamp post and clung to it with desperate energy when death appeared in the form of a tiger escaped from his cage. In a similar way, a young lady wading into Lake Michigan to drown herself avoided destruction by running to shore when threatened with being shot if she did not do so. Each had suppressed in one form only the instinctive tendency to avoid death, hence sudden impending destruction in another form produced the usual instinctive reaction.

So strong is the self-preservative instinct that few sane persons

commit suicide. It is also very difficult for any one to voluntarily injure himself. Considerable determination is necessary to prick one's own finger in order to get blood for examination under a microscope. It is also almost impossible to refrain from instinctive movements when injury seems to be threatened. The man who offered a prize to any one who would hold his finger against a glass without flinching, while a rattlesnake struck at it from the other side, was quite safe in doing so. In all sudden emergencies, where blind instinct rather than reason controls, action is nearly always governed by the individualistic instinct.

In deliberate action other instincts may temporarily attain ascendency in consciousness, yet none of them, as a rule, maintain their prominence for long periods of time. Many coöperative and communistic experiments have failed because they were opposed to the all-powerful individualistic instincts. Coöperative institutions, which appeal to other instincts and to the individualistic also without opposing the one to the other, are, on the other hand, grand successes.

PROMINENCE IN THE YOUNG

The instinct of self-preservation is not only the oldest instinct, but one that has been most uniformly useful to all species from the earliest beginnings of animal life; hence, we should expect it to be strong in the young child. There is, however, a still more important reason for expecting it to be strong in the young of all animals, including man, viz., because it is the only instinct that can be of much use in this stage of early helplessness. Any tendency on the part of a young animal or child to act for the good of any other being than itself would be futile, and in many cases injurious to itself and indirectly to its species; hence, the individualistic instinct *must* be dominant in the young of all species which survive.

The dominance of this instinct in the child is due, not so much to its greater absolute intensity in childhood as to the fact that he has at first neither the power nor the tendency to use any other instinct. When older, other instincts develop in a form which leads to action for the good of others. The individualistic instinct is then less prominent because it is no longer the *only* source of action. It is doubtful, however, whether the individualistic tendency is really decreased very much in adults, though its influence is partially counteracted by other instincts and by training.

The young child needs not so much to act for his own good, as to act so as to make his necessities and desires known to his parents; hence the instinctive and acquired powers of expression are made to take the place of self-care. Activity in forcing his wants upon the attention of adults is often more helpful to him in securing the means of subsistence, safety, and development than activity on his own account in trying to get them. The child, therefore, naturally becomes a persistent beggar. He not only makes his wants known and forces them continually upon the attention of parents till his desires are satisfied, but often seems to assume command over his elders as his servants, and to demand of them what he wants. This tendency is natural and unmoral, not immoral; but both for the child's own good and that of his elders, it needs to be kept within bounds and directed. Even mother birds, cows, and dogs find it necessary, as their little ones grow up and become able to care for themselves, to refuse their demands and perhaps drive them away to look out for themselves. In a similar way parents should continue to do things for a child only so long as he is unable to do them for himself. Even before that, social training should be begun by requiring him to indicate his wants quietly and politely.

One of the most common and serious errors of parents is to

extend and prolong their protective care to such an extent that children have little chance to learn the nature of the world in which they live. Children are saved from educative bumps and deprived of the opportunity of getting out of simple difficulties.

DEVELOPMENT OF INDIVIDUALISTIC INSTINCTS INTO MOTIVES

The individualistic instincts, like all others, are at first blind. All the child's early movements are for his own well-being; hence, the ideas, emotions, and volitions that develop from these movements are concerned with obtaining desirable things for self, though he has, as yet, no clear idea of self.

In the second and third year, when the adaptive instincts and the lower forms of the social instinct are very prominent, and the self is only partially distinguished in consciousness from others, whose acts and mental states are so frequently reflected in the child himself, action is less directly individualistic. The child does and feels as others around him, and sometimes seems equally well pleased whether he or some one else gets or does a thing, though in other instances he is very strenuous about being the one to do, taste, see, etc.

In the fourth and fifth years, when the child has become more of a self-conscious being, he looks ahead to the favorable or unfavorable results of actions, and recognizes the fact that favorable results to another often mean that they shall not come to him. The charming appearance of unselfishness in desiring others to eat, see, hear, etc., then often disappears, and he, as a matter of course, tries to get all good things for himself. Reflex sympathy and the desire for approval influence his motives and actions to a considerable extent; but often he tends to choose consciously that which will bring pleasure to himself, regardless of how it will affect others. Sometimes he schemes to both gratify selfish impulses and to secure social approval, as did a

little girl who had been taught to take the smaller piece, when she insisted on giving her brother his choice of two parts of an apple, instead of taking her choice first.

By example and special training, however, the social instinct of sympathy and desire for approbation may be made dominant, but politeness secured by punishment is likely to be superficial.

In general, the question which the child naturally asks concerning objects and persons is, "What are they good for?" meaning by "good," "What can I get out of them?" He is the center of the universe, and everything and everybody is for his pleasure. Persons, as well as things, are valued in proportion to the amount of satisfaction he can get from them.

The first few years of school life are preëminently the period of selfness or individualism. The child's chief motive in life is to get everything possible for himself, — objects, sensations, knowledge, privileges, and honors. It is the period in which individual rivalry is least checked by altruistic impulses. The interests of the child's family and special friends are looked after, largely because they are his. The prowess of a big brother, or the possessions of a father, or the goodness of a friend are merely a part of the young monarch's treasures, to be exhibited to those outside of his dominion. Their interests are to be advanced as a means of self-enlargement. If, however, their advantage should conflict with his, they at once become of secondary importance. Every new acquisition of possessions, friends, knowledge, experience and power is enjoyed as an enlargement of the kingdom of self.

To be thoughtful only of the interests of others, or to be interested in anything not concerned with the advancement of this kingdom of his, would be alien to a healthy, normal child. He cares as little for things outside of his domain as did the people of ancient nations. The way in which the child mind relates everything to self is beautifully shown by asking children to give

sentences containing such common words as cat, house, book, and noticing what a large proportion of the sentences bring self in (*e.g.* "*My* cat is white," "*My* uncle has a bull dog," "This is *my* book") as compared with corresponding sentences written by older children or adults.

INDIVIDUALISM THE BASIS OF HIGHER DEVELOPMENT

The extreme egoism or selfness of a child from six to ten is not to be deprecated (though it may need some mitigation), for it is an important and valuable phase of development. The usefulness of any individual depends upon what he is, the knowledge and power that he possesses, and the use he makes of them. It is therefore necessary that the first law of life should be one impelling to self-enlargement and development. If the law of service to others were the dominant one in early life, there would never be a self capable of efficient service. It is fortunate, therefore, that no training can entirely suppress or overshadow the individualistic instincts in early life, otherwise many children would soon be so good they would be good for nothing as men and women.

Modesty is undoubtedly a most admirable thing in a man, especially in one who has already developed a great personality, but it is very disadvantageous in a child. The more pride and ambition a child has, so long as it is connected with active effort rather than passive enjoyment, the better for his future development. If praise and reward prompt to fresh effort (within the limits of his strength), a child can scarcely have too much recognition of his achievements. What would be insufferable egotism in an adult is perfectly proper in the child. If the child has companions who are his equals, and is held to standards of attainment which require his best efforts, he may be freely encouraged in the belief that he is accomplishing wonders.

Every parent and teacher should frankly recognize that the

all-power motive to the child is gain to self. The gain to self should, however, take the more refined forms of securing the approbation of others or of demonstrating his power to do things for them; but it must contribute in some way to the enlargement of the child's self, in the minds of others and to his own consciousness.

All intelligent training is based in part upon the individualistic instinct. If it is good training, the child will discover that he gets more for himself in the long run by being kind and helpful than by being selfish and unmindful of the wishes of others. If the training is bad, it will lead the child to the belief that he gets the most when he disregards others, and gets all he can for self. The worst possible training is the fond and foolish kind which appeals to unselfish motives (without success, of course), inflicts no punishment, and guards from the natural consequences of acts.[1] A parent who guards a child from the natural results of his wrong acts, and a teacher who makes many rules that only the good children take the trouble to obey, while the bad ones enjoy the forbidden privileges, form the worst conceivable combination, especially if the child has no chance to play with children of his own age. The rough companionship of the playground without any attempt at control by parent or teacher would be much better. If he strikes another child, he gets a blow in return which teaches him that such actions are not profitable; while if he strikes a fond parent he gets no blow, and by a little crying in addition he may get some jam.

Even sympathy, gratitude, and all the higher virtues are based in part upon an adequate regard for self. Only one who has experienced an unpleasant mental state and felt a strong desire to be freed from it, can appreciate such mental states in others and experience gratitude for relief. The golden rule is of most

[1] For illustration, see Tanner, *Journal of Childhood and Adolescence*, Vol. II, pp. 91–99, 229–246.

significance to him who cares most for himself, providing he can imagine the condition of the other person.

THE FEEDING INSTINCT

This is one of the three most distinct forms of the individualistic instinct and one of the first to be manifested. Physically, the feeding instinct is the essential one in early childhood, but mentally it is of no great importance. The apparatus for satisfying the instinct is so nearly perfect at birth, and the sensations given by the first food — milk — are so mild, that the act of nursing produces little consciousness except of a general feeling of satisfaction. When the instinct is not satisfied, the sensations arising from hunger and from the act of crying are, however, probably among the first vivid conscious experiences of the child. The sense of taste proper plays a small part in the mental life of the child during the first two years. His curiosity, playfulness, and interest are much more readily excited by tactile, visual, and auditory stimuli than by taste proper. The pangs of hunger and the pleasure of satisfaction rather than taste sensations render the feeding instinct prominent in early life.

Variety in food develops in a positive way the instinct for eating, so that by the time a child is three or four years old sensations of taste occupy a prominent place in his consciousness. This continues for several years, and there is probably no time in life when gustatory pleasures and pains are more intense than at five or six years of age. To be able to gratify the desire for agreeable food and avoid disagreeable tastes is at this time one of the chief motives in life.

FEAR

Next to feeding, the most fundamental instinct is that of *fear*, which is shown in the action of escaping or avoiding danger. From another point of view, fear is the *emotion* experienced when

such actions are performed, and especially when they are interfered with. Starting at loud sounds is one of its earliest manifestations in children.

Another early and striking evidence of this instinct is shown in the fear of falling which often appears at the age of one month, and lasts only a few weeks. This form of the instinct may never become conscious, since it dies out so quickly. The child may then enjoy being tossed and caught as he falls. Later he may be ready to step fearlessly off a high place and learn only by experience to be afraid.

The modes of manifesting fear are various, such as running, hiding, screaming, keeping silence, changing color, etc., but they are all largely instinctive, and at one time in race history were connected with self-preservative actions.

All new, sudden, and strong stimuli are likely to call into action the fear-expressing apparatus. Sounds are more frequent causes of fear than sights, probably because such stimulation may be more strong or sudden. Aside from the strength, suddenness, and newness of the stimulus given, it is doubtful whether one kind of object is in itself more fear-exciting than another. The dangers to young animals are so various that it is doubtful whether in many cases any one kind of danger could have developed a specific kind of fear, such as fear of hawks by chickens, of cats by mice, or of snakes by children. The important thing for a young animal is that he shall respond as his parents do to new stimuli, or if they are not present, that he hide or get away from possible danger. The chicken crouches when its mother gives the danger signal. When alone it also crouches when a hawk sails over. It does the same when any large object suddenly appears from above. This is perhaps a partly specialized fear of the species which lives on the ground and is usually attacked by enemies from above. The mouse avoids the cat because its mother does, or as it avoids all moving things which

are new to it. The child fears a snake because of the shudders, exclamations and stories of adults, or possibly because of the strange form and movements of the reptile.

A common form of specialized instinctive fear is that excited by the danger call of parents. If there is any other fear that is instinctive it is fear of darkness, but possibly that is a *condition* in which fear may readily be excited rather than a specific *object* of fear. All animals and persons are more easily frightened in strange surroundings as well as by strange objects. Darkness makes the surroundings strange and unknown; hence, in darkness fear is readily aroused.

In the case of children in the dark no external object is necessary to excite fear; imaginary objects are sufficient. Unless children have been accustomed to a light, they never become frightened at the dark until their imagination develops. When a child is capable of picturing events, the recall of any fearful experience, while in the dark where the eyes do not contradict the imagining, is sufficient to excite fear. Thus a little girl about two, who had been told the story of the "Three Bears," with realistic imitations of the large bear, suddenly developed fear of being left without a light.

After a child has once experienced fear in the dark, that tendency is apt to continue. His imagination makes vague or vivid pictures out of the various objects dimly perceived and this is why a partially lighted room often arouses more terror than one wholly dark. Sometimes the more vague and indefinite the picture, the greater the fear, for it has the element of strangeness and the child has no means of demonstrating that it has not objective reality. Where some definite visual object is feared, the fear may often be allayed by bringing a light and showing what it is, or that nothing is really there.

There are few children who do not, for a considerable time, suffer tortures in the dark, often without the knowledge of their

parents. An unsympathetic or ridiculing adult does not invite confidence; hence even if the child's fears are of sufficiently definite things to be expressed (as they often are not), he does not make many attempts to explain. He either suffers in silence with head covered or finds all sorts of excuses for getting adults to come to his room or for having a light.

The period of greatest fear, though it varies with special experiences, is usually at about three or four years of age. No matter how careful parents may be about having their children frightened by stories or otherwise, they frequently become at this time virtually little "'fraid cats." Biologically, this is the time when they begin to act for themselves to some extent away from parents, and consequently the time at which readiness to become frightened and run home would be most useful. Psychologically, it is a time when the imagination is very active, and when its action is not limited by any fixed laws of possibility or probability. Children, however, who are unimaginative, or who are fortunate enough to escape fearful experiences, are occasionally at this time literally without fear. Never having experienced it they do not know what it is. A single experience, however, in which the child is really frightened (not merely hurt), may transform him into an arrant coward.

Fear should be and usually is a waning instinct, yet one that never entirely dies out. As the child becomes better able to take care of himself, and more familiar with his surroundings, fear in the sense of a sudden and strong emotion becomes less, though fear in the sense of caution or prudence is increasing. With progress in civilization, and knowledge which makes the conditions of life safer, and leads more and more to the belief that even the unknown is governed by known laws, fear should gradually die out.

Undoubtedly, there is less fear than formerly, but many people suffer all their lives from fears which are usually quite

unreasonable. Some of these fears of objects and of natural forces and forms, such as thunder, fire, water, caves, reptiles, and insects, may be survivals from more primitive conditions of life; but they are probably merely transmitted from one generation to another by social heredity. Other fears, such as of guns, engines, knives, etc., cannot possibly be instinctive.

Fear in the sense of prudence, which leads one to avoid what is likely to bring unpleasant results, or in the sense of caution in regard to incurring unknown consequences, is a good thing; but fear, in the sense of a sudden, strong, paralyzing emotion, is injurious physically, stupefying mentally and degenerative morally. It makes one's life miserable, weak, unworthy. Every effort should therefore be made to eradicate it and to develop courage.

A certain kindergarten teacher had a strong fear of mice, bugs, etc. One day a mouse appeared in the schoolroom. Realizing the necessity she controlled by a great effort her tendency to show her feelings, and calling the children's attention to the little animal's search for crumbs, she and they watched it together. In giving nature study lessons she resolutely concealed her aversion to the caterpillars and other objects which were so interesting to the children, and in the end her antipathies entirely disappeared.

Fear is so powerful an instinct in children that by means of it they may be made to do almost anything. It should not, however, be used as a motive except in the milder forms, which develop prudence and caution rather than terror.

As to modes of dealing with the fear of children, a few general principles only are clear. Occasions of fear should be avoided as far as may be, and when it is excited, reassurance given as quickly as possible.

Not only are fears excited by actual and imaginary experiences of the child, but by the manifestations of fear by the child's

companions; hence companionship with those who are easily frightened should be avoided. To compel children to endure terrors is decidedly cruel, and utterly useless as a corrective. If their fears can be allayed by temporarily bringing a light or otherwise removing the cause of fear, or if the child can be induced to be "brave" and face it himself, much is gained. Unreasonable fears, which are the most common and least dependent upon experience, cannot, as a rule, be dissipated by reasoning; but one can only trust to quieting assurances, time and experience, and the growth of courage and self-control, to effect a cure.

Fears caused by unfortunate first experiences with a class of objects may usually be dissipated by reasoning and favorable experiences. The quicker such cure can be applied, the better. For example, a two-year-old boy was frightened by a thunderstorm; but at his first call, suggesting rising terror, his father went to him and talked to him, comparing the flashes to the lighting of great matches, and remained with him awhile, admiring the beauty of the storm. The result was that he never afterward showed fear of a thunderstorm.

Fears that cannot be overcome by reason may often be cured by persistent action in opposition to the fear; *e.g.* to get over the fear of cats one should not only cease to show fear of them, but should think of their agreeable qualities and *act* as if they were desirable pets to be with and to fondle, thus changing his motor and mental attitude toward them.

THE FIGHTING INSTINCT

The fighting instinct and its accompanying emotion, anger, are early aroused by anything interfering with the child's activities or wishes. It is first manifested by crying, turning away the head, pushing away an offending object, and later in kicking and striking, and not infrequently by stamping with the feet or striking the head against the floor.

In general, this emotion is more intense and easily aroused in children than in adults, but also very much shorter-lived. Within a space of less than half a minute, a boy of two fondly stroked his mother, then jumped from her lap in anger when she refused to let him do what he wished, then burst out laughing at something he saw.

In dealing with this emotion care should be taken to avoid occasions of anger, especially when the child is hungry or otherwise in an irritable mood, and equal care taken that he gains nothing by his outburst, but rather loses something. Under no circumstance should the parent or teacher meet anger with anger, for nothing will more surely make the matter worse. Indifference, isolation, or a calm resistance which makes the child realize the utter uselessness of his passion are usually more effective. The reaction following a futile outburst of anger is likely to arouse reflections which if skillfully directed may lead to future efforts at self-control.

As to the fighting instinct, and the much mooted question whether boys should be allowed to fight, it may be said that the instinct is a natural and legitimate one if not carried to excess. A boy with no tendency to fight under any circumstance would be unnatural as a child, and probably a nonentity as a man. Nothing can be more unwise than to tell a child he *must never* fight. It is not only unwise but wrong to absolutely prohibit a child from fighting — wrong to his nature, and to that of other boys, who will thus be tempted to impose upon him. Fighting is a crude form of social action adapted to the early stage of human development, and may result in valuable lessons.

On the other hand, as a rule, the tendency to fight needs no encouragement. The best corrective for extreme pugnacity is, however, an encounter with a superior in the art, rather than the words or blows of some one in authority.

Competition is a form of fighting that is very prominent all

through life. The tendency to individual competition is very strong the first half-dozen years of school life and may very properly be utilized in school. Care should be taken to make it fair to all, and after a time it should take the form of competition of groups rather than of individuals. In this form it is of course more social than individualistic.

Exercises for Students

1. Give illustrations of the strength of individualistic instincts in adults.

2. Give proof showing the uselessness to the species of any other than individualistic acts by children.

3. Give a number of observations you have made, showing how children are governed by individualistic motives.

4. It will be well to make the experiment of having children and adults write sentences containing common words, and note to what extent self is brought in.

5. Two children of four and six, who went to buy a present for baby sister and for grandma, could hardly be prevented from buying things that neither baby nor grandma could use, though attractive to children of their own age. Why was this?

6. Mention a number of ways of using rivalry in school.

7. Women are more personal in their relations than men; they are also better primary teachers. Is there any relation between these two qualities?

8. Which should a teacher praise, perfectness of results or individual effort and achievement? Why?

9. Which would you rather have, a child with too much or too little regard for and confidence in self? Why?

10. Illustrate how a child may be led to see that he can get more pleasure by obedience and kindness than by the opposite.

11. A little girl who had often been reproved for not persisting in her tasks showed a great deal of gratitude when her father worked a long while to make something for her. Why was this?

12. Give illustrations of sympathy and gratitude of children.

13. Report observations or reminiscences of the prominence of the desire in children for good things to eat.

14. Give a full report of your own fears at different ages, also report observations that you have made.

15. Give evidence for and against the view that there are special instinctive fears.

16. Illustrate the importance of first experiences in giving rise to fears.

17. Show how caution may be developed without exciting fear.

18. Report from observation and reading modes of treating anger.

19. Discuss evils and advantages of fighting among boys and the possibilities of regulating and redirecting the instinct by having them engage in boxing, football, or hard work of any kind, and by teaching them to attack causes of exasperating conditions instead of persons concerned in them.

Suggestions for Reading

On the instinct of self-preservation, see Drummond, *Ascent of Man*, chap. vi, and Ribot, *Psychology of Emotions*, pp. 199–206, and on egoism and altruism, consult psychologies, especially Hoefding.

On the early emotions and their expression, see Compayre, Vol. I, chap. v; also Preyer, Tracy, *et al.*

On fear, read Ribot, pp. 207–217; Hall, *Am. Jr. Psych.*, Vol. VIII, pp. 147–249; Stanley, *Psycho. Rev.*, Vol. I, pp. 241–256; *Am. Jr. Psych.*, Vol. IX, pp. 418–419; Barnes, *Studies in Ed.*, Vol. I, pp. 18–21; Calkins, *Ped. Sem.*, Vol. III, pp. 319–323; Sitwer, *Kg. Mag.*, Vol. XII, pp. 82–87; Tracy, pp. 44–47; Preyer, Part I, pp. 164–172; Sully, *Studies in Childhood*, chap. vi; Rowe, *Outlook*, Sept. 4, 1898, p. 234.

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CHAPTER VIII

THE DEVELOPMENT OF THE RACIAL INSTINCT

LATENESS OF DEVELOPMENT

THE term "racial instinct" includes all native tendencies to produce and care for the young. Since sexual reproduction is the rule in all animal life except in a very few of the lowest forms, and since it has been necessary among all species that have survived, it might be supposed that the racial instinct would appear in man at a very early age. This instinct, however, does not, as a rule, appear with much prominence until more than a dozen years after birth; hence primitiveness and universal usefulness cannot, in this case at least, be the most important factors governing the order of the development of instincts in the individual. Evidently the principle of usefulness, as determined by *degree of maturity* of the young animal and the conditions under which he must live, is the factor of greatest significance here.

All physical and mental tests show that the differences between boys and girls are slight up to ten years of age. As a rule, boys and girls exercise very little sexual influence upon each other until just before puberty, though there are of course many exceptions. Most of the little "love affairs" between small boys and girls are not greatly different from the chumming of those of the same sex.

At puberty, however, there is a change. At first it is manifested in a slight shyness in each other's presence, or in repug-

nance to the companionship of the opposite sex. A little later there is a subtle attraction toward persons of the opposite sex, and a marked tendency to dress and act differently in their presence. This tendency soon becomes very strong. In the meantime, distinct sexual feelings may have been experienced in connection with dreams or otherwise.

In the ideal normal development the sexual feeling and impulse are unconsciously the basis of the attraction toward the opposite sex, and of the desire to attract the notice of its members and please them. The age of love and romance has come, and well for the youth is it if in loving he is conscious only of the physical beauty and moral and intellectual worth of his love, while the unconscious sex passion remains an unrecognized but all-powerful force, impelling him to devote himself unreservedly to the object of his regard.

There are, however, earlier manifestations or premonitions of one form of the racial instinct in caring for pets and younger children by both sexes, and in doll play, chiefly by girls. It may be, however, that such care-taking activities are the result of social influence and imitation, or, as Hall suggests, of fetichism rather than of the development of the racial instinct.

The protective instinct is very strong in the higher animals for brief periods, while their young are helpless; but in man it is much more lasting and of a higher form, leading to care for intellectual and moral, as well as physical welfare. Parents live again in their children and strive to secure for them a broader, better, and happier life than they themselves have had. All normal persons have the impulse to protect and assist the weak and helpless, and the higher spiritual instincts can only be satisfied in this way. All good teachers, especially of younger children, have this instinct in a marked degree. Teaching, in a measure, takes the place of parenthood in the development and maturing of character.

RELATION OF THE RACIAL INSTINCT TO OTHER IMPULSES AND FEELINGS

Since the racial instinct is and has been in all ages absolutely necessary to the continuation of the species, and is in its very nature both individual and social, it has become associated with all forms of action.

On the one hand, it has developed the fighting tendency, since fighting for a mate is the most common form of combat. The tendency to competition is thus increased, courage is developed, and ambition aroused. On the other hand, it has developed the opposite tendency of seeking the favor of a mate. Most male animals engage in some kind of courtship in which they exhibit their powers and charms to the best advantage.

The tendency to certain forms of play and to adornment is also increased by the sexual impulses. Darwin and others hold that there is a close relation between the development of the æsthetic sense and sexual selection. It is significant that love is the most frequent inspiration to artistic productions in poetry, painting, and music. Lancaster finds that the appreciation of beauty is greatly increased at puberty. There is good reason, therefore, for holding that the æsthetic feelings and impulses are closely related to this instinct.

It is evident, without discussion, that the social instincts and feelings are only extensions of the racial instinct from the family to larger groups.

Moral impulses and feelings are evidently related to the racial instinct, since one of the first and most important forms of ownership is the ownership of a mate, and resulting from such ownership are certain rights and duties. In this instinct we find the first impulse to please, help, and guard others instead of to act wholly for self. The virtues of diligence in seeking food, and courage in fighting rivals and defending offspring, are

developed in the males, and those of patience and tenderness in the females.

The relation of the racial instinct to the religious was long ago suggested by the fact that revivals and religious excitement were frequently accompanied by many engagements and marriages. Modern research has confirmed this view and shown that in all ages and among all peoples, religion and the sexual impulse are related in some way. The exact causal relations are not yet clear, but both instincts involve something of the same feeling of love, reverence, and self-devotion to the object of one's love. Hence religious awakening frequently results in love for some one of the opposite sex, and love often leads to religious interest. For similar reasons sexual and religious excesses and abnormalities are frequently associated.

It is evident that the racial instinct is not only necessary to the life of the species, but also to the health of the individual physically and spiritually. No other instinct, therefore, exercises such a profound and far-reaching influence upon character.

RIGHT DEVELOPMENT OF THE RACIAL INSTINCT

Since the racial instinct is one of the most powerful of instincts, and in man is related to all phases of his nature, it is especially important that it develop along right lines. In order that this take place there must be avoidance (1) of an excessive or perverted development, and (2) of unfortunate associations in consciousness.

(1) Sex feelings and perverted functioning of the instinct sometimes occur in young children and even in infants, but most commonly at puberty. Looking at the matter from the *physiological* side, we note that not infrequently some physical defect is the cause of sex excitement and perversion in childhood. Circumcision is often helpful in preventing such premature development in boys. Uncleanness and irritation produced by

clothing are to be avoided as frequent exciters of the organs. The ganglion especially concerned in the sex instinct is located in the lumbar region of the spinal cord, and heat is a most potent stimulus; hence the sleeping of a child with back to a feather bed or to a companion, especially in a warm room or under thick covers, should not be permitted. Stimulating food should be avoided, and as puberty is approached it is especially important that the child have plenty of outdoor exercise and something to occupy mind and body.

From the *social* side it is desirable that boys and girls should play together freely without sex distinctions being made prominent. Social customs usually demand different conduct on the part of girls, but it were well to make the differences as slight as possible, before ten at least. Joking young boys or girls about their beaus is more objectionable than pulling at buds on the rosebush long before they are ready to open. Boys and girls should be permitted to remain good comrades and chums as long as possible without any thought of love.

There is no reason whatever for separating boys and girls in primary schools. In secondary schools and colleges there are many arguments on both sides. There is no doubt, however, that sexual development is more normal and healthy when the sexes are together a great deal than when they are separated. This, and the fact that the best education for life is most like the life to be lived, are strong arguments for coeducation in this country, where men and women meet so much on equal planes after they leave school.

(2) The question of greatest practical importance regarding the racial instinct is, "What conscious associations with the impulse shall be formed?" The associations may be low and vile, or high and pure. In the one case, selfish ~~sensualism~~ is likely to result, and in the other, altruistic devotion and social service.

This matter is closely connected with the question of how boys and girls shall acquire a knowledge of sex functions.

It may be asserted that in the case of this as in other instincts it is ~~best to let~~ the instinct gradually and naturally come into consciousness as it begins to function. This would be a good way to do were it not for a few very practical reasons against it.

In the first place, social customs and moral principles do not permit the functioning of the instinct except in a very limited and prescribed way, and that not until long after the instinct has become very strong; hence the necessity of controlling the instinct must be learned artificially rather than by the natural social punishment following indulgence.

Second, ignorance of sex functions cannot be preserved in boys or girls who associate with others. They inevitably acquire some knowledge, and that usually of the filthiest sort.

In the third place, the sex instinct, not having opportunity for its natural functioning, is likely to produce unnatural modes of gratification, whose evil effects are unknown to the youth. Recent studies indicate that this is the case among nine tenths of the best boys. Such unnatural gratification is injurious physically when carried to excess, as it often is, and more or less damaging morally even if not carried to excess. This is especially true where the imagination plays a large part in the indulgence. The fountains of pure love, manhood, and decency are often forever befouled. The youth is thereby unfitted for the highest type of love, the most perfect union with one of the other sex, and the purest fatherhood. His social, æsthetic, moral, and religious capacities are also almost inevitably undeveloped or perverted.

The importance of giving the sexual impulse right associations is very much emphasized by recent studies of sexual abnormalities. It seems that, on the one hand, almost anything, by means of association, may become a stimulus to the sexual feelings;

while, on the other hand, the unexpended sexual energy may be utilized in almost any line of physical, emotional, or intellectual life. Science, religion, and philanthropy, as well as art, literature, and industry, may be promoted, therefore, by the use of the unexpended energy of the all-powerful sexual impulse, diverted by appropriate associations into these channels.

It is surprising how long civilized people have continued to believe in the idea that children may be kept innocent sexually by keeping them ignorant of sex functions It has always been a double failure, for the attempt to keep children ignorant has almost universally failed; hence on that score the choice is necessarily between half knowledge reeking with secret filth and evil suggestions, and full satisfying knowledge drawn from the pure fountain of parental wisdom, accompanied with and suggestive of high feelings and holy impulses.

It is generally acknowledged that the sexual impulse is inevitably one of the most powerful inner life tendencies, especially during the adolescent period. This instinct may be the basis of all manly and womanly virtues, stimulating to love, tenderness, devotion, courage, and high aspiration in social, æsthetic, moral, and religious life, or the foul source of hate, brutality, self-indulgence, weakness, and low desires, in a purely selfish and beastly life; yet, as a rule, young people are allowed to remain ignorant of all this.

No parent who loved his children would permit them to go out from his care into new surroundings, sure to make or mar them morally, without seeking to prepare them for avoiding dangers and securing benefits in the new conditions of life. The adolescent is entering such a life; hence there is no excuse for allowing him to enter it without some foreknowledge of the facts, possibilities, and dangers to be faced.

The imperfect knowledge gained from companions is both unsatisfactory and misleading. Lancaster found in the posses-

sion of one advertising firm, seven hundred and five thousand letters from boys who had thus consulted quacks regarding their perverted habits and real or supposed diseases. Some had paid hundreds of dollars for treatment, when the symptoms described were perfectly normal (such as sexual dreams). Many of the boys were suffering untold agonies because they supposed they were ruined physically, socially, and morally. They dared not speak to parent, family physician, or adult friend, but poured out their whole souls to these distant and unworthy strangers.

As to when the knowledge should be given, the answer is plain, *i.e.*, when the child first questions regarding it and whenever further questions call for fuller explanations. An unanswered question is insistent; curiosity once aroused, grows by attempts of others to suppress or divert it, and the matter is almost surely dwelt upon secretly, and frequently knowledge is surreptitiously sought. If one waits till the advent of puberty, the mind of the youth is probably already befouled, and in any case, very much directing of attention to the matter at this time may stimulate undesirable subjective states. To speak frankly for the first time to a child of this age is also so embarrassing that not one parent in a thousand dare attempt it, though he knows it to be his duty. On the other hand, the perfect and unconscious innocence of the child of four who asks where he came from or about parts of his body, makes plain, unabashed speaking comparatively easy to adults who ordinarily cannot free the subject from its, to them, evil suggestions. Further and fuller information should be given as the child grows older. The tendency on the part of the child to go to the parent for information on this subject as frankly and freely as on other subjects, instead of seeking it secretly or of evil companions, should be carefully preserved.

Perfect truthfulness and frankness is the one essential, though much is gained by giving this truth sacred associations. Books

written for the purpose of giving sex information may be useful, but should not wholly take the place of frank talks between parent and child. Teachers may sometimes be very helpful to young people whose parents have neglected their duty in this regard.

TEACHING SEX HYGIENE AND MORALS

There is much difference of opinion at the present time as to the wisdom of giving instruction in sex hygiene and morals in school. Although admitting that such instruction should be given in the home, it is claimed with truth that the majority of homes are not giving it and that therefore the school should take up the neglected work. On the other hand, it may be said that effort might better be directed toward educating parents in the performance of this duty than imposing it upon teachers, who are less fitted for it in many ways. Instruction by a specialist may serve as a temporary expedient in school, and perhaps be of permanent value.

It is not likely, however, that the situation will ever be adequately met by special courses in sex hygiene in the public schools. The true solution will rather be found in giving such instruction regarding reproduction as naturally goes with the various subjects taught, instead of omitting those topics. The processes of reproduction and embryonic development should be treated with the same frankness and fullness in nature study, physiology, and biology as are other less important and interesting life processes.

In the high school the instruction needed is not merely physiological, but social and moral. Right social habits and ideals of morality are more necessary than knowledge.

Neither is it sufficient to show the possible dangers to self of excessive and irregular sexual conduct on the part of young people. Such teaching, even if it does not appeal to the spirit

of adventure rather than fear, will lead only to selfish caution. The fact that a future wife or child may be the innocent victim of one's self-indulgence may serve as a much more potent and noble motive for self-control.

Something more than negative teaching is, however, needed. Ideals of the highest types of sexual love as portrayed in literature should be brought to young people, and along with that there should be the greatest care exercised in the high school in promoting free, refined social relations between young people in accordance with the best social usages. By these positive, yet indirect means, much more may be accomplished than by occasional direct negative teaching of the evils following wrong conduct.

Suggestions for Reading

On the significance of the racial and social instincts, read Drummond, *Ascent of Man*, chaps. viii and ix; Ribot, *Psychology of the Emotions*, pp. 248–259, 275–289; Small, *Ped. Sem.*, Vol. VII, pp. 13–68.

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CHAPTER IX

THE DEVELOPMENT OF THE SOCIAL INSTINCT

FORMS OF THE INSTINCT

MEN are preëminently social beings. Among all races of men are to be found, not only families, but larger aggregations, living in close proximity and association with each other. This is necessarily so, since solitary individuals have little chance of survival in the struggle for existence. Desire for companionship is the natural inheritance of an ancestry that must have sought it in order to survive. Hermits are therefore rare exceptions, while to most persons solitude is the greatest of punishments.

This instinct is manifested in various kinds of native reactions to persons, such as observing, imitating, competing, and is also shown in several rather distinct forms, (1) in the tendency to seek the companionship of others, or *gregariousness;* (2) in the impulse to feel as others do, or *sympathy;* (3) in efforts to please others, or *love of approbation;* (4) in competitive and coöperative activity; (5) in loyalty and altruism. Ambition is the product of one or more of these tendencies.

(1) The *gregarious* instinct needs to be prominent in the young, as their life depends upon their associations with adults. Most children manifest a desire for the presence of adults before they can walk. A little later, though ordinarily shy of strangers, they seek the protection of any human being, if frightened by an animal. As early as the second year they manifest great pleasure in the company of children near their own age. Evidently they

feel the greater likeness to themselves, and this "consciousness of kind" produces a relationship different from that with adults. Young children not only enjoy the company of other children as they cannot that of older people who are so different, but they also often understand each other much better than adults understand them.

Association with persons who are older, and with those who are younger, gives pleasure and valuable social development; but these are produced in greatest measure by association with those of one's own age, where there is both give and take, coupled with a better understanding and efforts for common ends. Children, even as early as the second year, receive an education from being with those of their own age that can be obtained in no other way. The child who is never allowed to be with other children is deprived of a valuable birthright, and can never be quite the same socially as he would have been had he associated fully with other children. A child may be better in some ways and learn more by being kept with adults, but never can his whole nature be so fully developed.

Chums exercise a powerful influence over each other where the relation is continued for a long time, and this more or less complete sharing of life with another is a valuable experience. If, however, the relation is long continued, and is so close that there is no association with other persons, the effect is narrowing, because both are cut off from a wider social life. Again, if one of the chums is always the leader and the other a follower, the results are unfortunate, for every child should have experience in both capacities and also in competition with friends and equals.

(2) *Sympathy* is closely related to, and probably, to some extent, the product of, reflex imitation. The child reflects the emotional expression of others, and as a result feels somewhat as they do. Children, therefore, readily cry in terror, or laugh with glee, when those around them do so.

Real sympathy, of course, appears only when the child not only feels somewhat as others do, but consciously represents them as having feelings like his own. This is likely to occur in the third year. When the idea is once developed, it is likely to be extended not only to persons, but to animals, flowers, and even sticks and stones. The young child does not clearly distinguish himself from other things; hence his mental states are readily projected into them. He thinks of other things as feeling as he does; hence all nature seems to rejoice or weep with him. When something in which he is interested is injured, he also feels the injury much as if it were himself. The child is thus, in a way, the most sympathetic of beings, because he is identified with everything that he knows. He begs that relief may be given as if he himself were the sufferer, as indeed he is to a considerable extent.

On the other hand, when interested in himself and his own actions, it is often hard to get him to think of any one else. As he gets a little older, and distinguishes more clearly between his own experiences and those of others, the individualistic instinct takes the lead, and rarely does he feel an impulse to take suffering in place of another.

Again, the basis of a child's sympathy is his own experience; hence he is often indifferent to the deepest joys and sorrows of adults, though very sympathetic toward those who are annoyed by what is to him a cause of keen suffering.

In order to have sympathy aroused, one must not only have had experience of the kind concerned, but his imagination must be excited so that he puts himself in the place of the sufferer. Boys are often cruel, not because they wish to cause suffering, but merely because they enjoy seeing the victim make queer motions, without once thinking how it feels. Sympathy, therefore, depends not only upon experience, but also upon the imagination.

(3) *Love of approbation* has its origin in the race, perhaps in the fact that approbation of mates must be sought, and that the animals which do not make themselves agreeable to the group they belong in, are likely to be driven out to die. At any rate, the desire for approbation is very strong in young children, even when not developed by experience. The tendency to reflect the emotional signs and feelings of others, and thus to share their pleasure or disgust, is perhaps the basis of the child's desire to be looked upon with favor.

Even before a child can talk, he seems to be affected by words of approval or disapproval, if they are uttered in the appropriate tone of voice and with the fitting gestures and expression of face. When the fighting or competitive instinct is not aroused, the child is very sensitive to expressions of approval or disapproval from any one against whom he feels no antagonism at the moment. At first he cares most for approval of parents, later of teachers, then of companions. At puberty his ambitions are stirred and he wishes for the approval not merely of individuals, but for that of the world; in other words, he wishes to make a name and become famous. In middle life most men care more for their reputation, or, in other words, for the opinion others have of them, than for their own personal needs and individualistic desires. So strong is this instinct that what we eat, wear, read, and do are largely determined by it. The desire for approval never dies out, even in the breast of the most hardened criminal, who is often a hero to members of his own gang.

Children are not only greatly influenced by praise and blame; but they act, to a considerable extent, as parents, teachers, and others expect them to act. Children thus often become what their teachers believe them to be, and many a boy has been saved by the faith reposed in him by teacher, parent, or friend. It is therefore very important that educators should see the good in children. No one who has not a large faith in humanity, and

in the possibilities for good in every boy and girl, should ever enter the schoolroom as a teacher.

The approval of companions as compared with that of parents and teachers gains in influence with advancing years. The approval desired is not merely personal approval of individuals, but of the social group as a whole. In other words, the child comes to have more and more regard for the *public sentiment* of the social group to which he belongs. After a few years in school the public sentiment of a group of boys, as expressed in taunts, such as, "girls' work," or "tied to mother's apron string," is a more powerful stimulus than the words or even the blows of the parent or teacher.

In the early years parents and primary teachers who have the love of their children may get them to do almost anything by appealing to the desire for *personal approval;* but as children get older they care more and more for the public sentiment of their social group. The successful grade teacher must therefore learn to understand, mold, and use public sentiment in governing her school; while the high school teacher must do the same, but may also rely upon the general principles of conduct accepted by the world.

(4) *Competition* and *coöperation*, although in some respects opposed to each other, are alike supported by this powerful tendency. Doing as others do is a crude form of imitation, while the sight of another engaged in the same occupation as ourselves stimulates to more vigorous exertion. Whether a given situation shall result in rivalry or coöperation depends largely upon whether the end desired can apparently best be gained by surpassing others or by supporting their efforts. The most undesirable form of rivalry appears when, instead of endeavoring to surpass others, one attempts to interfere with their success. This is allied to jealousy and is more prominent in those who are inferior to their rivals in the power being tested.

The instinctive character of the competitive instinct is shown by the fact that competitors in a race, whether they be horses or men, make higher records than when running alone. For this reason records of paced and unpaced races are kept separately, the former always being more swift.

The competitive instinct is not prominent in small children, but from about seven years of age until near maturity its power increases. From about nine years on, few games are enjoyed that have not in them an element of competition and almost any sort of work may become a game if rivalry of the right kind and intensity is associated with it.

Such competition is naturally at first individual, one person striving to beat another; but it is easy to so arrange the contest that a group shall compete as a whole with another group. This prepares the way for coöperation and almost inevitably leads to it. It is soon found that success can best be obtained by agreement as to how all shall act or what parts each one shall take. A common end to be gained and an understanding as to the part that each shall take in securing it, are the essentials in all coöperative efforts. If coöperative effort is directed not so much toward securing the end as in preventing the other group from gaining it, something like war results.

(5) *Loyalty and altruism*, the highest forms of the social instinct, are shown in the tendency to act for the good of the social group of which one is a part, instead of merely seeking their companionship, feeling as they do, or seeking their approval. This tendency appears more or less prominently in the early teens.

At this time, when the youth first becomes capable of contributing to the life of the race, and of actually doing something for the group to which he belongs, his ambitions are aroused, and he dreams and plans for great deeds and great honors. The desire for approval is strong, but there is also a genuine impulse

to self-sacrifice. The youth of all ages have been ready to risk life, limb, and reputation, not chiefly because they are ignorant and rash, but because they have an instinctive tendency to disregard self and act for others.

Youths are now also genuinely selfish, since if a selfish act is done at this time it may be in opposition to an altruistic impulse, while before this it may have involved only a choice between immediate and remote pleasure to self. True selfishness emerges only when both the lower individualistic and the higher altruistic impulses are felt. The adolescent may therefore be the most selfish or the most self-sacrificing of beings, and is often each by turns.

The development of the impulse to social service is greatly favored by experience of all kinds in working with others for common ends. In such activities the individual's life is enlarged, and in contests of group with group he subordinates his personal interests to the success of his party, thus securing the broader pleasures of the social life.

We find, then, the development of the social instinct marked by increased regard for the interests of others and for law. Laws come to mean not merely the rules of action which bring to the child the most favorable results, but standards of conduct to be conformed to, whether agreeable to self or not, because they are for the good of the social group. This tendency is shown at the beginning of the teens, in class spirit in the school, in group games on the playground, in children's societies, and in the formation of gangs on the streets. Rivalry of group with group may be even more fierce than ever was individual rivalry at the height of the individualistic stage of development. The greater the rivalry, however, between groups, the greater the class spirit within the groups.

The social group, whose interests are regarded and promoted sometimes by self-sacrifice, is at first very small. Only slowly

does the social impulse broaden into general philanthropy and feeling of human brotherhood. Class spirit is a phase of social development that needs to appear in a radical form and in connection with rivalry as a preparation for the higher phases of social development. It should therefore be encouraged, but care should be taken that there shall be frequent change and enlargement of the social groups engaged, otherwise there is arrest of development, narrow prejudice, and partisanship, rather than broad sympathy and philanthropic effort.

Exercises for Students

1. Give illustrations showing the strength of the gregarious instinct in adults, children, and animals. Report instances of showing off and shyness, as illustrations of the social instinct in children.
2. Give examples showing desire for companionship with those of one's own age, and the advantages of such companionship.
3. Describe one or more instances of chumming you have known, and the effects upon each of the chums.
4. What are the characteristics of a leader? Should every child have some experience as a leader? How may he get it?
5. What kind of chums do children desire? Report observations or reading.
6. Does being an only child, or the eldest or youngest of the family, have any special influence on development? What?
7. Describe instances of sympathy on the part of children.
8. Show that experience and imagination are necessary to sympathy.
9. Show how large a part love of approbation plays in social life and morals.
10. Show how the teacher may utilize the love of approbation of children.
11. In what grades has personal approval most influence? In what grades is public sentiment more potent?
12. Discuss the kinds and degrees of self-government that may best be used at different ages.
13. Illustrate the prominence of altruistic ideals in the teens from experiment or observation.
14. Discuss the social value, to yourself and others, of membership in societies of various kinds to which you or they have belonged.

Suggestions for Reading

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CHAPTER X

DEVELOPMENT OF ADAPTIVE INSTINCTS — IMITATION

CHARACTERISTICS OF IMITATION IN CHILDREN

In general, we think of acts as imitative when they reproduce acts that have been observed by the performer. The psychological basis of imitation is the general tendency for the perception or image of an action to produce a similar action. Imitation is a form of suggestion in which the suggesting stimulus is reproduced.

If a *hungry* child begins eating when he sees some one else eating, the act is not properly imitative, for the child knows what eating is, how to eat, and has a tendency to eat; while the sight of some one else eating does nothing but suggest the idea, which would probably be aroused just as effectually by the sight of food or even by the utterance of the word "dinner" or the sound of the dinner bell. If, however, a child tries to eat *like* some one else, the mode of eating is imitative because the idea of *how* to act is gotten from the observation of the act. If a child eats when *not hungry*, or eats something he does not like because he sees another eating, the act is clearly imitative, because the impulse to perform it results from observing its performance. When a child makes a new sound that he has heard, or tries to pack a trunk after seeing for the first time some one else do it, the act is imitative in a greater degree than in the preceding instance; for the idea of the act, how to do it, and the impulse to perform it are all the result of observing its performance.

Many of the child's acts are imitative in this sense, but it is

doubtful whether this is true of many animals. Chickens, cats, rats, and dogs may run toward food or away from danger, or begin searching for food at sight of companions doing the same, or make noises in response to noises made by their kind, and such acts are often called imitative; but the animals know how to do these things and have a tendency to do them, and perceiving them done by another merely suggests the idea without modifying its form or giving it much impulsive force. A few cases, however, of fairly definite acts of imitation are reported by some experimenters with monkeys and other mammals.

Children, however, have a strong tendency to observe and perform new acts; hence, imitation is an important means of widening their experience and fitting them for various activities and conditions. In most animals imitation does little more than specialize and develop tendencies already possessed in some degree, in ways that will favor survival; while in children it leads to an almost infinite variety of action and adaptation to varying conditions. As already mentioned, imitation is the mode of learning most used by children in getting acquainted with the world in which they live.

CLASSIFICATION OF IMITATIVE ACTS OF CHILDREN

(1) *Reflex imitation* is shown when a child is caused to do something which he has a physiological tendency to do, by perceiving the act performed by another. Yawning, crying, laughing, and other emotional expressions, which may be reproduced by children in the first half year, are of this class. The stimulus to reflex imitation is largely *sensory*.

(2) *Spontaneous imitation* is shown when acts not provided for by other instincts are reproduced without any purpose other than the all-sufficient and unconscious one of an impulse to reproduce and to experience subjectively what has been observed objectively. The stimulus is usually a *perception* of some kind.

Everything, from the crowing of chickens to the whistle of a locomotive, from the wriggling of a snake to the preaching of a sermon, is imitated. Nothing in his environment, physical or social, escapes the child; he absorbs and makes it all a part of himself by reproducing, and thus getting a subjective knowledge of it. For three or four years this form of the instinct is dominant.

(3) *Dramatic imitation* is closely allied to the spontaneous, and differs from it chiefly in that the child now finds his own mode of reproducing or representing ideas. *Images* of previous perceptions are the usual stimuli. As in spontaneous imitation, there is no purpose outside of the act itself. Things heard or read, as well as those observed, are imitated; but the reproductions are not literal. Persons, animals, stones, and blocks are transformed in various ways by the imagination, and made to ~~aid in the representations. Symbols and images~~ thus take the place of real personalities and acts.

(4) *Voluntary imitation* or imitation for a purpose appears when a child reproduces an act, not for its own sake, but to gain some end, as when a child imitates a word he has heard, not for the pleasure of the act, but in order to get what he wants, or tries to walk like some one else to make people laugh, or tries to handle a spoon or pencil as some one else does, in order that he may eat or write successfully. This form of imitation is concerned merely with *how* to imitate or represent when such an act is a means to an end. The impulse depends upon the end to be gained, and not upon the mere perception of the act. Voluntary imitation is always more or less analytic and synthetic, attention being directed to the parts of the process, and to the order of combination or synthesis. *Memory* images are the guides in voluntary imitation. When a child imitates spontaneously the act of writing, he simply takes the pencil and scratches around with it; but when he voluntarily imitates the drawing of another, he watches his successive movements and tries to reproduce them.

Voluntary imitation is a different act from spontaneous imitation, as was most strikingly illustrated in the case of a child who, before the close of the first year, reproduced with phonographic exactness every word she heard; but later, when she tried to use words voluntarily as a means of expressing thought, she went through the usual stages of mispronunciation. Not often is this so marked; but every observer of children knows that children who spontaneously imitate the tones of those they hear speak and read, often find it difficult or impossible to do so voluntarily in response to a request. Every one can laugh or cry spontaneously, but few can do so voluntarily.

(5) *Idealistic imitation* is that form of imitation in which there is an attempt to act according to a copy or standard conceived as correct and desirable. It leads to and is guided by *concepts* adopted as ideals. It is an attempt, not to reproduce or represent any one act or object, but to act in accordance with an ideal derived from numerous particulars. Such ideals, whether social, æsthetic, moral, or religious, are naturally formed and imitated, not from a study of their verbal expression in the form of general truths, but as shown in concrete acts and objects.

DEVELOPMENT OF IMITATION

The different varieties of imitation combine and overlap so that detailed and exact statements cannot be made; but the general order of prominence is evidently that in which they have been named.

(1) *Reflex imitation* is the only form of imitation until the second half of the first year. Later it is obscured, but remains all through life as an important form of suggestion. It is for this reason that good humor and bad humor, politeness and rudeness, carefulness and carelessness, are "catching." All persons, but especially children, are like mirrors reflecting back what they observe, responding to smiles with smiles, and to

irritable words with similar words and actions. The personality and mood of each person is manifested in some degree in his face, voice, and actions, and the child reproduces reflexly to a greater or less extent every such manifestation, and is himself modified by it. If several children are together, each acts reflexly on the others. The teacher who comes into the room in the morning in an irritable mood soon infects some of her children, and these others. She is therefore confronted ere long by an irritable and irritating school; while the teacher who has entered the room with cheerful good humor and kindly feeling is soon surrounded by a joyous group of children eager to follow her leading and respond pleasantly to her slightest suggestion.

(2) *Spontaneous imitation* usually becomes very prominent the latter part of the first year. Although concerned with new acquisitions, reflex imitation is often combined with it, as when the tone in which a new word is uttered is reproduced as well as its pronunciation. In fact, the early imitations of words are often merely imitations of tones and inflections of voice rather than of specific sounds. This is probably due to the early development of reflex emotional expression.

Sometimes the early spontaneous imitations are of single sounds and gestures, and sometimes of more complex acts. The author's little girl imitated acts at first, as poking the fire, packing a box, driving a nail, but never gestures, such as raising the hand, nodding the head. Neither did she imitate words as such, but only the act of speaking on occasion. Children do, however, frequently reproduce sounds like a phonograph, and gestures, like a shadow, sometimes without ceasing their play to do so. In no case is spontaneous imitation analytic and synthetic. It is always of wholes, large or small.

The value of spontaneous imitation lies in the great amount of material accumulated in the form of knowledge and power of movement, which may be used or analyzed and combined, then

used in future actions for a purpose. The knowledge thus acquired is of immense extent and of the most fundamental character, for it is subjective as well as objective. The child learns to know movements and sounds not only as they are seen and heard, but also as they are felt when performed or uttered, and he can not only recognize them, but also control them. Thus by spontaneous imitation he makes the world his own and obtains control of it.

Although so various, spontaneous imitations are not the result of chance. Nothing is imitated that does not attract the attention. Attention is determined by the prominent instincts or experiences as they appear in the life of the developing child; hence, the spontaneous imitations of each age are indications of the stage of development that has been reached. The investigations of Frear indicate that young children spontaneously imitate animals and children, while in the majority of cases older children voluntarily imitate older persons.

At about three years of age *contrary suggestion* often appears, and, at more or less frequent intervals, controls the child's action. The child seems to be surfeited with taking into himself and reproducing from his surroundings. He therefore asserts his own individuality, which has heretofore been merged in whatever he imitated, and refuses to follow the copy set before him. He not only refuses to do what others do, and what it is suggested that he shall do, but as far as possible does just the opposite of what the imitative impulse would impel him to do. Usually these attacks are intermittent; but if unsuccessful attempts are made to forcibly suppress them, they may become chronic, especially if the child is not in perfect health. If no notice is taken of such attacks of contrary suggestion or self-assertion, or if they are vigorously suppressed instead of combated just enough to develop them, they are likely to soon yield to the more fundamental impulse of positive suggestion or imitation.

Spontaneous imitation develops not only by becoming more complete, and being concerned with more complex acts, but by appearing in response to mental images as well as to direct perceptions. Words, gestures, and processes observed yesterday are reproduced to-day as spontaneously and accurately as if just perceived.

(3) When the above stage of spontaneous imitation is reached, *dramatic imitation* usually begins. Dramatic imitations are not clearly differentiated in the mind of the child, or easily distinguished by the adult observer from spontaneous imitations. In purely spontaneous imitation the child reproduces literally, as well as he can, what he has observed, while in dramatic imitation he does not. Sometimes, however, he forgets that he is only making believe, and screams with terror at the attacks of a make-believe bear or weeps over the mishaps of the make-believe baby or kitty, or actually chews the make-believe bread, or is really worried by the idea that he is going to be left by the imaginary car, or cries with the pain of an imaginary burn or stomach ache. Usually, however, there seems to be a sort of under consciousness of the make-believe character of it all, which, as long as it remains, heightens the pleasure of trying to make it seem real.

Dramatic imitation greatly increases the possibilities of varied development, for much of what the child observes or hears involves actions or objects unattainable to him. There is nothing, however, from the noises and movements of a locomotive to the silent art of Jack Frost, or from making a pie to constructing a church, from burglary to a fashionable tea party, that the child cannot imitate by the use of make-believe objects and symbolic movements. The essentials of every process and action in the heavens above and the earth beneath, of which the child sees or hears, are made familiar to him in his dramatic imitations. He learns something of every custom of society, and every trade and profession, by the short-cut application of that most im-

portant of all pedagogical laws, "learning to do by doing," which is also the only sure way of learning to understand.

What a change would result if this dramatic power and tendency to imitation could be more frequently, sensibly, and effectually utilized in the kindergarten and school. In its very nature, dramatic imitation is spontaneous and original; hence any attempt at systematic control of it must, in the nature of the case, almost inevitably prove artificial and ineffective. The wise teacher merely stirs the imagination, supplies the material for dramatic representation, and gives occasional suggestions as they are needed. For example, some sixth-grade children, who were taught geography in such a way that with very little help and suggestion they eagerly presented in character the different races, in costumes which they had made, gained more of real development than in a term of formal memorizing.

Froebel did well to recognize the dramatic tendency in children; but his followers have often done ill in using the particular processes and occupations given by him, at stated times, instead of those most common and interesting in the child's environment, presented at the most favorable times.

The dramatic tendency usually begins in the third year and continues all through life, but is at its climax from about four to seven. During this time the child not only transforms objects, but persons, including himself, into whatever his fancy dictates or his dramatic play demands. He assumes the part of some other person, or of an animal, and perhaps for days at a time acts out the character to some extent, and insists upon being called by the name of the person or animal represented. So great is the tendency to represent by substitution, that even words are made to serve new purposes, as "yes" to mean "no." Sometimes the child at once forgets the arrangement he has made; then again he adheres to it for days or weeks, and insists that others do so.

This is the age also for the creation of *imaginary companions*, and a careful study of the matter shows that not only do a few lonely and highly imaginative children have these companions, but nearly all children have them in some form, for a greater or less period of time. It is only one step from representing persons by blocks to representing them in the mind without any tangible object. These imaginary companions frequently appear in the third year when the child is getting acquainted with his own variable personality, which is sometimes "nice" and sometimes "naughty," or in connection with early experiences with a playmate who is not present all of the time, or after hearing of a little boy or girl of a certain character. Sometimes the imaginary companion is an ideal self, sometimes a naughty scapegrace, and at other times not self at all, but a distinct personality. The same child may have many such companions at once, or one at a time in succession. Where the phenomenon continues, as it sometimes does, into adult life, it often takes the form of a continued story, in which the imaginary characters figure, and perhaps grow older as their creator does.

Curiously enough, during this make-believe age, the child is the most literal of beings as well as the most imaginative. Left to himself, he often has a wonderful perception of the essential truths symbolized; but when something is presented to him in symbolic form, and he has no experience corresponding to that symbolized, his ideas are surprisingly literal and materialistic. For this reason religious instruction often produces in the child's mind a gross caricature of holy things. For example, a boy did not want to be Jesus' "little lamb," because he would then have to eat grass. Myths and fairy stories also often fail to teach the truth intended, because the truths symbolized are not apprehended by the child.

(4) *Voluntary imitation* appears in the second or third year, but does not become prominent for several years. When a

child, instead of freely repeating over and over the same sound in the same way, tries again and again to speak a word as another does, each time changing his pronunciation a little and getting nearer the correct form, we have an example of voluntary imitation, because it is performed, not for the pleasure of the act, but to secure the approval that follows its successful performance, or the pleasure of being understood. Since, as we have defined it, voluntary imitation is for a purpose, it is concerned chiefly with the *mode* of performance.

Whenever a child is trying to find out how to do an act, he is very ready to voluntarily imitate any mode of performing it that he sees. It is also much easier for a child to imitate the performance of an act than it is to form an idea from a description of how it is to be done and then do it. Voluntary imitation is, therefore, one of the most important means of instruction, especially with young children. They can learn by watching how a thing is done, in a fourth the time required to learn it by being told how it should be done. This is true not only of manual, but also of purely intellectual processes. A child learns to add or to use good language by imitation better than by rule. Imitation might, therefore, very frequently be substituted for directions and rules. With younger children the imitation should be largely spontaneous, while with older ones it should be voluntary, and with still older children should be followed by analysis leading to specific directions or rules. Where the process is complex, some analysis is helpful in learning it; but the analysis should be simply into parts or simpler wholes which the child can grasp, rather than into separate elements such as the scientist is able to detect. Most of the practice should also be upon the whole process rather than upon the elements.

In using voluntary imitation educationally it is not best to merely give models for imitation. On the contrary, voluntary imitation should be simply a means of accomplishing successfully

something which the child already has a desire to perform. The great defect in teaching has been too much analysis of processes into elements, and too wide a separation of processes from the ends they are fitted to secure, so that the natural motives for learning are destroyed.

Unquestionably it is the function of the school in preparing the child for the work of life to develop the power of voluntary effort, and this means at first chiefly the power of voluntary imitation; but it does not follow that spontaneous imitation should not be utilized, or that the child should be required to voluntarily imitate what he has, as yet, no motive for learning to do. The child acquires the power and tendency to persistent effort by the act of persisting in what he attempts; and if he can be held to a task by the desire to learn how, in order that he may do something which he wishes to do, the motive is a natural one and far more effective than those arising from artificial punishments or rewards.

(5) *Idealistic imitation*, which is a sort of generalization from all other kinds, begins perhaps in the third or fourth year when a child has formed some idea of objects and acts that are "pretty" or "nice." A little girl of four who admired a little girl in a story who always walked and talked quietly and nicely, imitated her and apparently thought of her as an ideal. In a similar way, a boy of three seemed to have a pretty good idea of "Papa's Jolly Boy," and sometimes when not feeling well made considerable effort to smile and look pleasant under the inspiration of that ideal. Such idealistic imitation is, however, largely a matter of training till the teens are reached.

Spontaneous imitation leads the child to imitate everything which attracts his notice, whether profanity or prayer, caresses or cruelty, rudeness or politeness. There is little or no selection of the more admirable for imitation except as it is presented more often or made attractive by the approval, coöperation, or

help of others. In the home, at school, and on the playground some selection of ideals, leading to their imitation, is brought about by the attitude and actions of parents, teachers, and companions; but for the most part children imitate certain ideals of conduct not so much because the ideal itself appeals to them, as because adherence to it secures the approbation of others, and ignoring it, their disapproval and perhaps punishment. These ideals are built up and strengthened by stories of persons performing admirable actions and receiving praise and reward, and of the opposite results from the performance of bad actions. The ideals admired and imitated by the child are not his own, but those of his people and his times.

This remains true, in large measure, till the child reaches his teens, when he begins to find that within himself which responds with admiration or disgust, to certain deeds, acts, and objects. It is no longer merely his own interests or the opinion of others which arouse the feelings, but something within himself that reaches out toward or draws back from certain objects and acts, regardless of consequence.

This is emphatically the age of ideals and of hero-worship. Now, if ever, the individual is stirred by ideals of the strong and true, the beautiful and the good. Spontaneous imitation, and past and present example and training, still have their influence upon the selection of ideals for imitation, but not, as formerly, entire control. In this stage of ferment and change from which is to emerge a more or less unified and permanent individuality, there is developed an inner principle of selection which results in the formation of ideals for imitation. There is not a mere selection, as formerly, of certain objects, persons, and acts for imitation, but a choosing from various sources, of *qualities* which appeal to the individual, and a combination of these into standards and rules of conduct.

Often the youth forms ideals without at once imitating them.

He feels their worth, but has not the force of will to realize them in his acts. Usually, after a period of variable action, the ideals or the habits are modified so as to bring them more nearly into harmony, and the character of the developing man is pretty firmly established at a higher or lower level, according to the kind of ideals formed and imitated. Sometimes, however, the gulf between approved ideals and practice results in a permanent division of personality, in which one phase of it, then the other, dominates, as in "Dr. Jekyll and Mr. Hyde." This condition is much more likely to result when children have either been led to form high ideals without being induced to imitate them, or when they have been compelled to act according to certain standards which they have not been led to approve. If the child has learned to both admire and imitate his ideals, and if these ideals are merely deepened and broadened but not fundamentally changed during the transition period, then there is no break in the development; but the new element which comes into the youth's life merely perfects and completes what was begun before the age of transition.

Exercises for Students

1. Describe instances of imitation and indicate in each case how far perception of what is imitated gives any or all of these: (1) the idea of the act; (2) knowledge of how to do it; (3) the impulse to perform it.

2. Give examples of imitation in animals and compare with imitations of children, showing the difference.

3. Show how imitations by children lead to many adaptations, or, in other words, to the gaining of much valuable knowledge and experience.

4. Give original illustrations of each class of imitations.

5. State the order and the ages at which the different kinds of imitation become prominent.

6. Show the importance of reflex imitation in school. Is there any reason for objecting to the presence of stammering or nervous children in school? Can a noisy, unsystematic teacher teach children to be quiet and orderly? Why?

7. Show how spontaneous imitation prepares for the doing of useful acts in the future.

8. Give illustrations of contrariness as opposed to imitativeness in children.

9. Give examples of dramatic imitation in which you engaged as a child or have observed in other children.

10. Give examples of the ways in which dramatic imitation may be utilized in school.

11. Describe imaginary companions that you have had or which you know of other children having.

12. Give illustrations of symbolism which children have or have not appreciated.

13. Show how voluntary imitation may best be used in gymnastics, drawing, writing, word building, etc., indicating parts that need special practice, and the motives to imitate, which may be appealed to. Should a teacher seek to secure good vocal expression in reading by much use of voluntary imitation, or should she depend on spontaneous imitation and natural emotional expression? Why?

14. Describe your idealistic imitations at different ages.

15. Show why ideals are especially important during the adolescent period, and indicate a variety of means which may help in the formation of high ideals.

Suggestions for Reading

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CHAPTER XI

DEVELOPMENT OF ADAPTIVE INSTINCTS—PLAY

THEORY OF PLAY

THE older theory set forth by Spencer considers play to be the activity by which surplus energy is used. If we conceive of surplus energy as meaning superabundance of energy, the theory is not true to the facts, for children must be very sick or tired before the play impulse disappears. If, however, the word "surplus" is taken to mean, in a general way, the energy which is most easily set free, then play may properly be looked upon as the activity by which such energy is most likely to be utilized. Excess of energy is thus a condition favorable to play activity rather than an essential cause of it.

The more recent discussions of play, especially those of Groos, have emphasized its instinctive character. It is shown that young animals of all kinds have the play impulse, and that the form of the play is related to the instincts of the animal. In general, the animal uses the same powers that his ancestors have used in gaining food, avoiding enemies, and securing the perpetuation of the species, and thus exercises the powers he will himself need to use when no longer protected by parental care. Each instinct as it appears is thus developed and perfected by playful activity before it needs to be used seriously.

These two theories need to be combined. In play there must always be some energy which is surplus in the sense that it may be used in other ways than to obtain necessary ends. The activities most readily initiated are of parts which have most

available energy, either because they are growing and developing or are less fatigued than other parts. The way in which the active parts are used, depends upon the openness of certain "paths" connecting them, which is determined largely by the instincts that are coming into prominence at the time. The plays of young animals are therefore greatly influenced by the order in which their powers and instincts develop, and, in turn, play directly promotes the development of powers that will be needed in adult life.

In the case of adults, play is influenced by fatigue, and is a means of developing powers not used in daily work; hence it aids all-round development, and furnishes a means of recreation. Play and necessity are the chief stimuli to learning. In children, who are largely shielded from necessity, play in its various forms is the more important factor in development.

WORK, PLAY, AND AMUSEMENT

Objectively, work and play cannot easily be distinguished, although the results of playful activity are usually of little lasting importance, while work usually has results more or less valuable and permanent.

Subjectively, an act is playful when it is not only enjoyable, but is directed chiefly to the securing of pleasure, while it is of the work type when an end is being striven for and the activity is being guided by that end. Play is comparatively free since it is directed by pleasure, while in work there is some necessity for doing, and to secure the end there must be activity of the right kind at the right time, and in the right way, more or less regardless of desire.

Physiologically, work often requires the use of the same parts of body or brain in the same way, for a considerable time; while play, continuing one kind of activity only as long as is agreeable, exercises many parts of the body in a variety of ways, and usually

no one part for very long, without change. In work, the least available energy is often used, and the activity is always directed; while in play, parts having the most utilizable energy are freely active. For this reason work is much harder and more wearisome even when the amount of activity is less.

Often an act involves the chief elements of both work and play, and it is impossible to classify it with assurance under either head. A boy building a dam is said to be playing, while a man constructing a larger one for permanent use is said to be working. The boy is not compelled to engage in that activity at all, or at a certain time, or to continue the construction longer than pleases him. Yet if he becomes completely engrossed, he may feel that he must finish it in the way he has planned, before stopping. The man is to some extent forced by some need of his own or of the community, to begin and carry on his work; yet if he becomes thoroughly interested, his enjoyment may be as keen as that of the boy and he may do much more in the way of perfecting the job than necessity demands. Thus the best work has in it the essential elements of play, and the most enjoyable play involves as much directive effort as work.

Play is one of the most effective means of learning to work. Obstacles are met in most plays, and the child must do many things that in themselves are disagreeable, in order that he may carry out his plans. The act, as a whole, is play, though parts of it are work. The more complex a child's play becomes, the more work is there connected with it. Materials must be collected before a tea party can be held; bait must be dug and a long tramp taken before fishing is possible; bases must be marked out before the ball game begins, and forts must be built before the snowball battle opens. The boys who cleared a field of stones in dramatic play, by representing the stones as water, and the pile where they were dumped as fire, were playing, though doing with much more than their usual working vigor

what would have been very hard and tiresome without the playful exercise of the dramatic instinct to lighten it and make it enjoyable.

Nearly every adult must of necessity work, yet his work may be to him a most enjoyable play if it is well chosen and carried on in the proper spirit. If it is so well suited to his powers, and he takes such a pride and pleasure in it that he would continue to perform it if relieved of the necessity of thus making a living, then he is really playing while he works. This is perhaps more often the case with artists, authors, and inventors, but it may be equally true of a farmer, business man, mechanic, motorman, or teacher.

Games are intermediate between free play and work because they involve more or less direction of activity according to rule, and more or less repetition of the same acts; yet they are freely chosen and usually are played for their own sake, and not for results to be gained. Professional players, who are after the rewards rather than the pleasures of the game, are not playing, but working. This is also true to a considerable extent of college athletes who desire honors and sacrifice pleasure to win.

Amusement is a mild and passive form of play, a name of which it is scarcely worthy because it involves so little activity on the part of the one being amused. Some one else does the work (though perhaps in the form of play), while the seeker after pleasure enjoys it if he can. Here, as in other cases, there is little to be gained without earning it One who has been working hard may get a great deal of enjoyment and rest from amusements; but one who devotes his life to amusements, ceases to enjoy them. To amuse, a thing must be novel or exciting or appeal to phases of one's nature not affected by one's occupation. To hard-working people, with little surplus energy, amusements are a valuable means of rest and sometimes a source of general culture. To those whose available energy is used in their daily

tasks, amusements are almost indispensable, and play scarcely necessary; while for all others active play is essential, and mere amusement of secondary importance. Children, in general, need play rather than amusement.

In these days of urban life and specialization, in which few of a man's powers are used in his occupation, play and amusement are of far more importance than formerly. The man who does not play in some way soon degenerates, because so few of his powers are used.

CHANGES WITH AGE AS REGARDS FREEDOM IN PLAY

The first plays of children are wholly free, *i.e.*, follow no rules. Attempts to direct a child's activity by showing him how to pound or build are often resented in the first year or two. During the next three or four years, customs which serve the purpose of rules of the play may be established through imitation; but any attempt to dictate when, what, or how a child shall play is met with opposition. Suggestions must also be given with care.

Upon entering school the child is ready for games with very simple rules, but quickly loses his interest in a game having many rules, because too much voluntary effort is required to play it. For example, drop the handkerchief is enjoyed very much when there is no rule except to pick up the handkerchief and chase the dropper, then leave it behind some one else; but if the more complex form is tried, in which the one behind whom it is dropped must discover it for himself, or go inside the ring, or must run in a certain direction while the dropper, if caught, goes inside the ring, and those inside get out by being the first to seize the handkerchief when dropped behind some one in the circle, very young children find it puzzling and irksome, though older children, familiar with the game, enjoy it more than the simpler form.

During the first five years the child's activities are free and imaginative and are almost wholly of the kind called play; while in the period from five to ten, games become more and more prominent, and after twelve, plays other than dramatic have almost wholly given place to games and sports.

Play must always be free in the sense of being engaged in because the individual wants to perform the acts for their own sake and their immediate results, such as satisfying the instinctive desire to win in a contest. If a person is forced to play, or paid for playing, the act is at once transformed into work. Tennis played *only* for the benefit of the exercise is not play, but work.

Play becomes less free with age, in the sense that activity is directed in definite lines by the requirements of the rules of the game. This conformity to law does not decrease the freedom of the individuals engaging in the more complex group games, but rather increases it by restricting the action of each individual as to kind, time, and place, so that one may not interfere with another. Children enjoy playing with an older person who leads according to rules, and they thus learn to appreciate the value of rules, so that they become indignant with the companion who interferes with the game, and consequently with the freedom of each player, by refusing to conform to rules or by trying to cheat.

The great lesson of law as a means of freedom is nowhere so well taught as in well-directed and orderly play. In no other place can a child so fully realize for himself the value of law as on the playground. A teacher who can successfully lead children to play happily in accordance with whatever rules are necessary, is not only forming public sentiment in favor of orderly and fair play, but she is also preparing the children for good citizenship more effectually than she can possibly do in the schoolroom, unless the children are led to have as keen a personal interest in what is being done there.

CHANGES WITH AGE AS REGARDS POWERS USED IN PLAY

Children begin playing in the second quarter of the first year, and long before the close of that year have engaged in a great variety of plays. Almost every sensation and movement which comes under their control is repeated again and again as play. Objects are scratched, rubbed, pounded, rolled, and tossed about almost continually. If in doing so the eye and ear are variously stimulated, the pleasure is all the greater. Not only objects, but parts of the child's own body, are used as instruments of play. This is perhaps most marked in the case of the mouth and vocal organs, which during the first year or two are endless sources of amusement. The powers most exercised in this early play are evidently those of the sense organs and the muscles. There is no attempt to use them accurately or in any definite way, but merely to use them freely over and over, yet with infinite variations. In shaking brightly colored balls or a rattle, it is hard to tell which is the greater source of pleasure, — the varied and repeated muscular sensations, or the changing and recurrent visual and auditory sensations; but either alone is sufficient to call forth the play instinct, for the sight of waving ribbons or dancing sunbeams is a visual play, as sounds and jingles are auditory play, and movements of limbs, muscular play.

For two or three years the child's play is almost wholly sensory, motor, and perceptional. Great progress is made, however, during this time, for the movements become much more complex, so that all parts of the body are used at once, and they are not merely used but exercised in doing specific things involving some accuracy, as in preserving the balance when jumping or throwing something, or in hitting objects or piling them up so they will stay.

In the sensory and motor plays of children the mental powers

are also used so that there is perception of likeness or difference and of space, as the child pounds objects and puts one inside of or on top of another and arranges (or scatters) them to his satisfaction.

In the third year the representative powers are developed sufficiently to be used extensively in play. The child begins to find amusement in reproducing or representing acts and events that have been observed on previous occasions. He delights in reproducing phrases, rhymes and actions, and in representing events, as a visit to a neighbor or a ride. Soon nearly all of his play is transferred to the field of imagination, where his freedom is complete; and no object is so remote, rare, or costly that he cannot have it in the form of a representation, and no process so difficult that it is not readily performed (in his mind) by the manipulation of a few simple objects. Feasts and fêtes are provided on short notice, and without the hitches that so often trouble adult dispensers of hospitality.

Imagination as a director of playful movements usually approaches its climax in the fifth and sixth years. After this, imaginative play may be occupied for several years with enjoying and creating fanciful stories often associated with dramatic action. Fairy stories are interesting largely because they give playful exercise to the imagination. Later, the less free activity of representing historical and geographical facts may be engaged in.

As the child grows older, mere exercise of physical powers becomes a less important element, though any new movement, as standing on the head, turning somersaults, skinning the cat, walking on the hands, etc., always appeals to the ever developing instinct of play. After five or six years, familiar movements are made in play, not merely to use the power, but to use it in some definite way, involving quickness, strength, endurance, or accuracy. From six or seven years to puberty, testing exercises

of physical powers are important elements in the plays and games of children, especially of boys. During the latter part of this period there is not only desire to do what companions can or what they cannot do, but to reach certain standards, to "make records."

From six to twelve the perceptive and representative powers are not merely used, but tested along with the physical. Thought power has been used to some extent before this time in connection with the imagination, in judging and reasoning as to the proper and logical mode of representing persons and events (*e.g.* the larger stick must be papa and he must sit at the head of the table or must drive the horse, or the yellow block must be the car and the black one the engine and the latter must be in front). Later, imaginary incidents and scenes must conform to the laws of probability. Thought power as a distinct element in the pleasure of play is not, however, very prominent till about seven or eight, when guessing games and riddles begin to have a great fascination. A little later, games that chiefly exercise thought power, such as flinch, checkers, cards, authors, come into favor, and finally perhaps the most intellectual of all games, chess. To some children the thought activity involved in such subjects as mathematics may be as enjoyable as play.

In general, we may say that every power, physical and mental, as it appears, is playfully exercised, and thus its development is hastened, and after each power is developed to some extent, it is tested and perfected in contests and games.

CHANGES WITH AGE AS REGARDS INSTINCTS INVOLVED IN PLAY

The early stages of almost all instincts are manifested in play, and after they are used for the serious purposes of life they are still important factors in more or less playful activities outside of one's vocation.

Perhaps the earliest instinct to be shown in play is that form

of curiosity which delights in changes. For this reason, peek-a-boo and other sudden transformations are enjoyed, when repeated over and over again. A certain interval of preparation before making a final movement which effects the change, seems to add to the pleasure. This indicates that the rhythmic tendency is, from the first, an important element in children's play. The early enjoyment of recurrent sensations, movements, and jingles is further evidence of the early prominence of this instinct.

The movements of emotional expression in attitude and voice are often made playfully in the third year, though the expressive instinct has a serious use for them from the first.

The feeling of personal power in effecting changes is an important element in play, as soon as the child gains control of his hands.

As soon as a child attains any form of locomotion, whether rolling, creeping, or walking, he delights in being chased. This, one of the most universally useful of all instincts, is prominent in play at all ages and is the chief element in nearly all the more popular games, at least before puberty.

Imitative acts, when repeated over and over without purpose, may be considered as playful; hence imitative and dramatic plays are very popular from three to seven, and dramatic play continues in favor much later.

It is hard to say just when the fighting and competitive instinct is first manifested, either seriously or playfully; but competition is the most prominent element in the play of children from seven to twelve. It continues to be a prominent feature in games all through life, but is often subordinated to the group or social instinct which develops at puberty. Such games as baseball and football, which involve coöperation and subordination of individual prowess and honor for the sake of the greater prowess and honor of the group (which represents the youth's

larger self), are then most favored. This coöperative or tribal tendency is also manifested in connection with predatory instincts at the beginning of puberty, in the formation of gangs for such purposes as hunting, fishing, robbing, teasing policemen, or fighting boys of another neighborhood. Other instincts taking the form of play or involved in play are the constructive, collecting, and æsthetic instincts, all of which begin early and continue all through life, varying with age as to the form they take.

PLAY AS A FACTOR IN EDUCATION

Necessity is not only the "mother of invention," but also of a great deal of knowledge of all kinds. Animals, nations, and individuals must learn something of their environment, such as how best to secure food, escape danger, and preserve their species. This is true of adults, but not in so great a degree of young animals and children, for they are, to a considerable extent, screened from the necessities of life by parental care and protection. Without this protection, necessity would be to the young, in their weakness and ignorance, an executioner rather than a teacher.

How shall these helpless and ignorant young ones become strong and wise? Partly through physical development as determined by inner laws governing the growth of the species, and partly through occasional touches of necessity in spite of the screen of parental care, but chiefly through Nature's jolly old nurse, Play, who charms animals and children into using every power as it develops, and into finding out everything possible about their environment from the heavens above to the earth beneath.

Practically all education among animals and savages is carried on by "Mother Necessity" and "Nurse Play," but among civilized people there is a third teacher which we may designate as "Stepmother Authority." All civilized people select certain

truths and activities which they regard as valuable, and induce the children, by various more or less artificial means, to learn them and thus prepare for the life they are to live as adults. Such education, if consistent and wise, may be very valuable, but it is artificial. It often does not make use of natural impulses, and is therefore very wasteful of the energy of both teachers and pupils. If the natural educators, necessity and play, were properly utilized, it would be like travelling with the wind and tide instead of by wearisome rowing in dead calms or against adverse winds.

Since the conditions of life are now quite different from what they were in a savage state, we need a special preparation for life as it has to be lived now. Activities which would in a proper degree develop all the powers possessed by our ancestors would not give the best preparation for the life of to-day. It is necessary, therefore, that truths and activities suited to modern life shall be selected, to the end that children may be properly educated. If the child comes in contact with this artificial environment, necessity and playful imitation will induce him to choose many, perhaps most, of the truths and activities which will be of greatest value to him in life. Yet it is still necessary for authority to do something in the way of selecting and arranging educative truths and activities for the young.

The teacher, in presenting this educative material to the children, may act as a servant of authority and simply require, by rewards and punishments, that children shall take it, or she may try to present it in such a way that the greater portion of the time the child recognizes no other teachers than stern "Mother Necessity" and joyous "Play." If she succeeds in the latter method, play is the chief factor in education during the early years; but gradually more and more place is given to Necessity, until she is the honored director of activity in manhood, or perchance both give place to the twin sisters, Doing and Achieve-

ment, who smile alike on work that is as joyous as play and play that is as valuable as work.

In school, where what is to be done and learned is determined by the course of study, there are yet so many ways of doing and learning that it is often possible for the teacher to arrange exercises so that the dominant powers and instincts of the children at each age shall be called into activity in a playful way. Curiosity supplies all the interest necessary in learning new things; but something else is required in drilling on what has been learned, to produce accuracy, speed, permanency, and facility in using. It is in this part of school work that the play impulse may be utilized to the best advantage. With a little ingenuity every such exercise may be so conducted that it will really be play. It will also be work, in that the child will be induced to perform again and again the same act, but without weariness, because the act is variously associated, and always agreeably, in new combinations with powers and instincts that are being playfully exercised. All school exercises in which repetition to secure skill and accuracy is necessary, including word drill, numbers requiring rapidity in fundamental operations, factoring, etc., and fixing facts of geography, history, and grammar, may be conducted as games rather than as formal drills.

In conducting such exercises the teacher may or may not call them games, and she must not make them too easy. Most games owe their charm to their difficulty, and nothing is more tiresome and destructive of real interest and ambition in children than doing easy things only. On the other hand, there is nothing so stimulating and inspiring to children as to be allowed to do things that are supposed to be difficult. The more difficult an exercise can be made to appear to children the better, providing they are not deterred from trying, and that it is not really so difficult that they cannot succeed.

The other essential to the success of such exercises is that there

shall be frequent changes to give variety. Except for very young children, these changes may consist largely of slight modifications in the exercise which make it more difficult in one way, then in another, as they acquire facility in successive phases of activity. By such changes interest is maintained through variety and by the constant re-adaptation of the exercise to the growing powers of the child. Adaptations to new powers and instincts are also desirable as the child develops.

In planning educational games for younger children, the muscular, perceptive, and imaginative powers must be called into action and tested. When children are a little older, reasoning ability may be exercised and imagination and memory tested. As children grow older, the tests may be made more difficult and complex, resulting finally in tests of various powers combined, including thought power. The rhythmic, imitative, and dramatic instincts may be chiefly appealed to in the younger children, then from seven to twelve the competitive instincts, and from ten years on, the coöperative, group, or class spirit. The chief points to be recognized are that the drill be neither too difficult nor too easy, that there be some element in it that appeals to the children, and that variety be introduced in order that there may be no fatigue or loss of interest.

In utilizing the play impulses care must be exercised that the child learns to enjoy and appreciate work and to engage in it when necessary whether he enjoys it or not. If he feels keenly the necessity, usefulness, or beauty of a task and believes that he can perform it, he will enjoy doing it, although parts of it may be unpleasant. The play impulse may lead one to desire to achieve, and along with it should be cultivated an appreciation for things that are worthy of achievement. This will combine in the most happy way the play and the work impulses.

Exercises for Students

1. Mention some plays of animals and children that you think develop their instincts and prepare them for adult life.

2. Describe the recreations of some adults you know, and explain on the theory of play. Why do brain workers engage in manual labor and city people go to the country for recreation?

3. Why is a mason piling up brick, working, and a child piling up blocks, playing?

4. Is one who engages in billiards or bowling to secure a prize of value, working or playing? Why?

5. Is drawing or singing work or play for you? Why? Is any of your work really play to you?

6. Mention games and sports that are especially valuable in preparing for work, giving reasons.

7. Yoder, in his study of the boyhood of great men, found that most of them were noted players when boys. How do you interpret this?

8. Mention several amusements as distinguished from play, and indicate their value, if any.

9. Is there danger in these days of moving pictures and pleasure parks that children shall play and work too little and be amused too much? What should be done?

10. Does the statement, "A teacher should interest her pupils," mean she should amuse them, or what does it mean?

11. What plays and games did you most enjoy at different ages? What games are most popular among children you have observed at different ages? Determine as well as you can what characteristics of various games make them popular, taking into account the freedom of the game, the powers used, and the instincts involved.

12. Mention things some animals you know of learned by necessity. Mention things you and other individuals learned because it was necessary, Mention differences in knowledge possessed by the people of different regions. produced by conditions under which their life must be maintained.

13. Which has been the larger factor, necessity or the play impulse, in developing practical knowledge? The sciences? The arts?

14. What connection is there between the statements that we should utilize the play impulse of children and that we should appeal to their interests?

15. Mention indoor gymnastic plays that are good for recreation and

physical development. When the teacher directs each movement, are gymnastics a rest or another form of work?

16. Describe games that may be used in numbers, arithmetic, geography, and history in certain grades, and indicate changes that may be made as the children progress.

17. Discuss possible disadvantages of having children learn by playing instead of because they must do tasks.

Suggestions for Reading

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CHAPTER XII

DEVELOPMENT OF ADAPTIVE INSTINCTS — CURIOSITY

FUNCTION OF CURIOSITY

FROM the moment that the sunbeams dancing on the wall, or the little hands waving before the eyes, hold the infant's gaze, till the time when the latest discoveries in science are eagerly examined by the savant, curiosity in some form is daily and hourly a factor in human action and thought.

Curiosity is even more omnivorous than imitation. It is at first almost entirely unselective, except as stronger stimuli force themselves upon the attention. It may be described as an appetite for new experiences. In infancy everything is new; hence, everything is interesting. Curiosity is early manifested in a tendency to prolong a sensation, as by gazing at a new object; or to reproduce it, as when a sound is made again; or to act so as to get one or more additional sensations, as when an object seen is felt of; or to find the relation of one sensation to others, as when a child discovers that touching an object being struck, deadens the sound. Later, similar things are true of ideas.

By means of curiosity a child is brought into intimate relation with various phases of his environment instead of simply those that minister to his existence. Everything around him is made a part of himself. The trees, the hills, the birds, the people of his home surroundings are compared and related to what he finds in new surroundings.

The greater the knowledge of environment gained through curiosity, the greater the possibility of adaptation to environ-

ment, as occasions arise involving applications of knowledge which has hitherto been useless. Thus a child who has learned a word through mere curiosity may be able to use it as a means of getting what he wants, or one who has learned through mere curiosity that wood floats, wasps sting, plants grow, fire burns, etc., may on occasion use the knowledge in a practical way. Other instincts tend to produce the proper response to present stimuli, while curiosity is continually preparing for the right response to conditions that *may* be met in the future. It lays up great stores of knowledge which serve as a basis for useful reactions. If man never learned anything before he had occasion to use it, he would suffer in countless ways from improper and delayed action. Necessity is a great teacher, but curiosity is a greater teacher in early life, because even in early infancy it gives lessons which prepare for life. It does not inflict immediate and severe punishment as does necessity, but it gives present joy and prepares for great rewards in the future.

The race as well as the individual has learned by means of curiosity. In its highest form curiosity has led to many scientific discoveries of no immediate practical value. Sooner or later, however, these abstract scientific truths nearly always find valuable practical applications.

CURIOSITY, ATTENTION, AND INTEREST

Curiosity, as an instinct or impulse, produces in consciousness a concentration of activity called attention, and a feeling accompanying the act, called interest. Studying attention and interest is therefore the chief means of studying curiosity, since they are largely the result of curiosity, though other instincts and much experience may also be involved. The simple mental state of attention to the *act* of eating, or of drawing back from a dangerous object, is the result of the feeding and the fear instincts; but attention to the *taste*, *feeling*, or *appearance* of

food, or the *characteristics* of the object of fear, is due mainly to curiosity. Often there is a prolonged period of attention and interest, before action in the way of eating the food, or backing away from the fearful object, or of approaching for closer investigation. Curiosity may, therefore, either support or oppose the attention and interest excited by other instincts. For most instincts, however, especially for play and imitation, it is a forerunner and supporter in the sense of leading to a closer examination of objects, though this often results in checking the usual instinctive mode of reaction to those objects.

The essential characteristic of a stimulus which arouses the instinct of curiosity is that of novelty. Since, however, a stimulus must have a certain degree of intensity to be effective, and as everything is at first new, it is the louder sounds, the brighter colors and stronger contrasts, as, for instance, the dark hair and white forehead of the mother, which secure the infant's attention when he begins to take notice in the latter part of the first quarter year. The sensations that are repeated, however, soon cease to be noticed, through loss of novelty.

Close observation shows that certain objects, sounds, or colors are attended to longer and a greater number of times than others of equal or even greater intensity, objectively speaking. This suggests the well-known fact that stimuli are effective according to the sensitiveness of the organism to them rather than according to their mere objective strength. A slight touch on a boil or a corn is a stronger stimulus than a hard blow on some other part; in a similar way individuals differ greatly in sensitiveness to the same sounds, colors, and objects. As a child's instincts develop, he becomes more sensitive to certain stimuli, consequently his curiosity is more readily excited in some directions than in others. When a child's competitive instincts are strong, he likes to hear of contests; and when he has been flying kites, he likes to hear how children in other countries and scientific

men fly them. Children's interest or curiosity, therefore, changes with the development of new instincts and with new experiences.

The tendency to imitation and play heightens the interest for a time by helping to disclose new characteristics of the object, then decreases it by effectually removing the essential element — newness. Though curiosity is thus continually destroyed by the results of its own action assisted by play, the knowledge thus acquired becomes the basis for a fresh growth of curiosity and play a little later. For example, colored cubes lose their interest when played with a great deal, only to regain it again and again as increased experience with other things prepares for new uses and the consequent observation of new characteristics. The child, after losing his interest in looking at and touching them, enjoys placing them in rows, or on top of each other, building houses of them, counting their sides and edges, comparing them with other solids, noting their weight and material as compared with other cubes, and finally studying geometrical relations of all kinds. Thus familiarity with the shape and composition of the first cubes prepares the way for noticing the characteristics of blocks differently shaped and composed, and also lays a foundation in experience for a study of mathematical relations.

Since nothing is noticed as new except as it differs from the familiar, every familiarity prepares for a fresh novelty. The materials produced by the self-destructive acts of curiosity therefore furnish a rich soil for the growth of a more vigorous interest. This growth of interest through increase in knowledge may be illustrated mathematically. If you know but two characteristics of an object, you can compare these with two of another object; but if you know four, you can compare with four and thus make sixteen comparisons; while if you know eight, you can make sixty-four comparisons, or thirty-two times as many as when you knew only two. The increase is, therefore,

in a geometrical ratio. To him who gains knowledge, more interest and knowledge is continually given.

Curiosity has, therefore, two means of increasing interest: (1) through new stimuli gained by changing or enlarging one's environment, and (2) through increasing knowledge of familiar objects by the discovery of new relations. From the psychological point of view the problem of interest is concerned chiefly with the effects of *experience*. Psychology shows how interest may be promoted by a changing or enlarging environment, and by increasing the knowledge of things already in the environment.

From the child-study point of view, however, the problem is one of *development*. It is not to find how any particular kind of desirable interest may be increased by external influences, but to discover at what stages of organic and instinctive development the child is especially sensitive to certain phases of his surroundings, or, in other words, to determine what interests, if any, are naturally strongest at each stage of development. This is a very difficult matter because, as we have already seen, previous experience is such a large factor in interest that it is hard to tell what is interesting because of inner conditions of development, and what is interesting because of experience and training.

CHANGES IN CURIOSITY WITH AGE

Curiosity has so many forms, and the impulse toward the new so frequently alternates in children with the love of the familiar, as shown in love for old stories, games, etc., that the general course of development is hard to trace. There are times when nothing but something new will satisfy the child; then again, he wants nothing but the old, the familiar. Such changes, though irregular, are frequent enough to suggest that curiosity impels to the perfecting of a system of knowledge of certain phases of the environment, then to a reaching out after a new environment. Play and imitation make the more obvious

characteristics of this new territory familiar; curiosity then leads to a fresh excursion into the new, but there is often a return to the old, which is then reviewed in the light of the new experience.

Early in life, and whenever a new object is introduced, the kind of curiosity or interest excited by the mere fact of newness may be called *empirical*. Later, the same object excites curiosity, not because of the new sensations or ideas it gives, but because of the desire to trace the relation of some of its characteristics to those of other objects. The curiosity or interest thus excited may be called *speculative* or *relational*.

The curiosity of children is doubtless largely empirical, partially because there are more new things for them to experience, while adults who have more knowledge to relate to whatever they perceive are more concerned with speculative interests.

Before a child begins to talk, his interest is mainly in getting new sensations and noting their relations; but when the instinct of expression awakens, names for experiences are sought in the constant question, "What is that?" which is satisfactorily answered by a name. After various objects and acts and the names for them become familiar, the interest changes to their relations, and the constant questions are: "What is that for?" (use), and "How do you do that?" or "What do you do that for?" (how and why). Again, for a time, interest goes from objects and acts to their origin, and the constant question is, "Where did that come from?" Later, "Why?" questions predominate, but often with a little different meaning. They refer less to subjective reasons for doing a thing and more to common laws or general truths, *e.g.* "It is dark because the sun has gone down." Interest now is often concerned with the applications of truths that have previously been learned. "Is the sun down?" — "No." — "What makes it dark, then?" This stage is reached as early as the third or fourth year. Frequently at about this time every question regarding a general truth is succeeded by

another "Why?" till the puzzled adult reaches what the persistent little questioner accepts as an ultimate reason, or the circle is completed and the first answer is given, or in exasperation the child is told to "keep still."

From the earliest days of taking notice, movements and actions are the strongest stimuli to curiosity. This remains true all through life, but in the greatest degree before entering school and immediately after. Children of two years use nearly twice as large a proportion of action words as adults. Professor Shaw found that in school, the younger children, when asked to tell what they thought when certain words were named, mentioned actions more frequently than the older ones; Barnes, that they were more interested in the use of things; and the author found that if asked to give a list of words, younger children gave more action words than older children and adults. Vostrovsky found that actions were prominent in children's own stories, and Köhler, that they remembered the action of stories told them better than descriptive details.

As to other interests, Vostrovsky found that in children's stories names, appearance, time, place, and possession are prominent; while Barnes found that in history they questioned most about cause and effect, who, why, personal detail, general detail, and least about time and truth.

As to objects of interest, various studies of children's reading and of their spontaneous drawings indicate that they are interested, in the earlier grades, in colors rather than in form, and in animals and children rather than in adults.

As to the mental powers appealed to, Barnes found critical inferences most numerous at twelve and thirteen, and Lindley, interest in reasoning and puzzles greatest at twelve.

At about twelve, interest in history greatly increases, as all studies of reading interests show, probably because history supplies in a representative form new environment and experience,

but more particularly because the social instincts direct curiosity to the study of groups of people. A little later, moral and religious questions have a great fascination, probably because the regulative instincts are developing. Æsthetic interest also increases at this time.

Since curiosity is modified by every new instinct, changes in curiosity may serve as signs of the development of new instincts. The boy's interest in fables prepares him for wise action in the pursuit of his individual ends, and the youth's historical interest in groups of men, for performing his part as a social being.

CURIOSITY AND EDUCATION

Long ago Plato said, "Curiosity is the mother of all knowledge"; but too often since then she has been regarded as merely the mother of gossip and scandal. The latter, however, are illegitimate children, resulting from poor feeding and union with small and unworthy passions. The legitimate offspring of curiosity are interest, learning, science, and love of truth.

Children enter school as animated interrogation points, and instead of having their mental hunger gratified, they are stuffed with knowledge they have not asked for, and required to answer instead of being led to question, until their intellectual appetite is dulled and only the most stimulating diet appeals to them. They are led to study only by the desire for approbation, or by some form of compulsion or reward. It is not the truth they are after, but the words and acts which will satisfy the teacher; hence, the slightest change in her expression or tone of voice often leads them to modify their statements.

Unfortunately, curiosity and interest, like play, are often identified with amusement, by many teachers, when as a matter of fact, healthy curiosity is one of the strongest stimuli to effort. Of the two ways of exciting curiosity, that of giving new experiences by showing or describing something never seen before,

and that of directing attention to unobserved qualities or relations of familiar objects, the first is unfortunately the mode more often used by those who try to interest children in their lessons. In many cases, therefore, teaching has become nothing more than the art of amusing. The result is that all the sweetness is taken out of a subject before there is anything of value learned about it, and subsequent teachers find it almost impossible to interest the children in these unpalatable and half-chewed materials. Not only has the delightful flavor of newness been removed from the subject, but the mental habit of taking rich food instead of working for daily bread has been cultivated, until in many ways the children are, intellectually, pampered weaklings. Their curiosity is aroused only by intellectual doses highly seasoned with the new and marvelous, administered by teachers who know of no other way of appealing to interest.

The old-fashioned discipline of rod and ferule, wielded according to fixed rules, compelled the scholastic prisoners to learn their trade, and thus effective intellectual workmen were often turned out, who had performed difficult and unpleasant tasks till they had no thought of hesitating at any drudgery. Unwise attempts to carry out the imperfectly understood doctrine of interest have developed intellectual laziness and repugnance to effort.

Properly understood and applied, however, the doctrine of interest will emancipate, not enervate, children intellectually. Just as a free laborer does a vast deal more work than the most closely watched slave, and does it with a pleasure and self-respect the slave can never feel, so does the child, working under the stimulus of interest, accomplish far more intellectually and morally than the uninterested urchin who slaved at his task under the watchful eye of the old-time teacher.

Interest that is educationally valuable is not that which pleases and amuses (though a little such interest is helpful,

especially with young children), but that kind of interest which causes effort to be put forth in order to satisfy the hunger for knowledge. The real test of interest is not how much *pleasure* do the children get out of the study, but how much *effort* do they put forth in pursuing it. Curiosity, like play, may be the stimulus to an immense amount of what would otherwise be drudgery.

The conditions most favorable for rendering curiosity a strong motive to effort are (1) the perception of the relation of what is being studied to familiar and interesting experience and knowledge, and (2) receptivity to the kind of knowledge being gained because it is suited to the stage of development the individual has reached. Many other things are helpful, but these are the most important essentials. How to bring about the first condition is the problem of psychology and pedagogy, while the second condition can only be secured through child-study investigations.

The purposes of education must determine what shall be taught; psychology, how or in what order subjects shall be taught, that each subject and part of subject may form a basis of interest for the next; while child study must say when and how certain teaching shall be given, in order that the natural curiosity and interest of each age may be utilized. The teacher should use her skill in associating studies with the child's instinctive tendencies at the time, and with his more recent activities, that there may be no lack of natural, healthy interest regarding every subject as it is pursued.

If properly appealed to, curiosity alone is a sufficient motive for the invasion of every fresh field of knowledge; while imitation and play will supply the practice and drill necessary to insure continued possession of it. These instincts may very properly be supported by others, especially the desire for approbation in the earlier years, the pleasures of competition, and the desire for results, in the later years of school life.

Sohan Rai Sinakot

Exercises for Students

1. Has the search for scientific truths usually been carried on in order that they might be directly applied in practical life, or merely that the truth may be known? Mention some such truth that has proved useful.

2. Give illustrations of knowledge of environment, gained by yourself or by children through mere curiosity, that will prove or has proved useful later.

3. Illustrate how stronger or newer stimuli excite curiosity.

4. Give examples of children who are especially curious regarding certain objects, acts, or lines of thought.

5. Give illustrations of the relation of curiosity (*a*) to other instincts, (*b*) to past experience.

6. Illustrate from your own experience or observation how increase in knowledge develops new phases of interest.

7. Show how interest may be increased through new experience gained by enlargement of mental environment, without changing one's location.

8. Illustrate further how increased knowledge of familiar things has increased the interest of yourself or of others.

9. Give illustrations of children's interest (*a*) in the old, (*b*) in the new, (*c*) of fresh interest in the old, after study in other lines.

10. Can you determine what were the causes of your interest in certain kinds of reading at different ages?

11. Give instances in which children seek to give the answers the teacher wants rather than to find out and state the truth.

12. Illustrate what children will sometimes do of themselves in the way of investigation and study when curiosity is excited.

13. Give illustrations of how teachers may or have connected topics with recent experiences and interesting activities outside of school.

Suggestions for Reading

On curiosity as an instinct, see Lindsay, *Mind in the Lower Animals*, pp. 252–256; Ribot, *Psychology of the Emotions*, pp. 368–379; Groos, *Play of Animals*, pp. 214–222; Morgan, *Comparative Psychology*, pp. 297–298.

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Sofer Rai Singhvi

CHAPTER XIII

DEVELOPMENT OF INSTINCTS – REGULATIVE

I. Moral Instincts

PREPARATORY STAGE OF MORAL DEVELOPMENT

The child's instincts are nearly as independent of each other and also as dependent and as closely related as are individuals in the social organism. Each instinct stimulates to action for its own gratification, just as each man seeks his own interests. The individual in society learns that certain actions are undesirable, because they result in other persons performing acts that are unpleasant to him. Out of such experiences grow the laws governing society. The child finds that some instinctive acts are more pleasurable than others, or that one kind of act interferes with another, and thus learns to regulate his conduct. He is also impressed less directly with their undesirability by the attitude of other people. For example, a child who was drinking water in such a way as to get his dress wet, said, "I don't care if it does run down on me." Mamma, "But I care; it isn't nice, and if you do it any more I shall take your glass away." Child, "I won't do it any more then, never."

The child is at first neither moral nor immoral, but unmoral. He is acting according to his natural instincts when biting and striking his mother as much as when he is hugging and kissing her, and no more. In both cases he acts as his instincts and feelings at the moment prompt, and to him one act is just as good as the other. Experience, however, soon teaches him that one

kind of act brings pleasant results in the way of approbation and favors, while the other brings him disapprobation and perhaps punishment. He thus learns that some acts are better than others. "Better," however, means to him primarily more pleasurable in results to himself rather than morally better. He is not kind or cruel in a moral sense, neither is he truthful or untruthful, honest or dishonest; but he readily learns to be whichever secures him the most advantages.

What habits of action he shall form, or what he shall come to regard as right or wrong, is wholly a matter of experience and training. The law of his nature at this time impels him to conform to his environment in such a way as to get as much pleasure and as little pain as possible. For about a dozen years this individualistic law of life holds almost complete sway; hence, this is the period during which the child is naturally unmoral. It is distinctively a *preparatory* stage of moral development; yet it is not for that reason any the less important. The foundations of a future less individualistic and more altruistic moral life are being laid.

MORAL TRAINING DURING THE PREPARATORY STAGE

In this stage should be developed: (1) regularity of physical and mental processes, (2) the consciousness that it pays to do right, (3) the tendency to inhibit impulses, (4) to endure hardships, (5) to wait for future good, (6) to take pain before pleasure, (7) to seek the satisfaction of higher instincts, (8) to form right habits, (9) to act from increasingly higher motives, (10) to form right ideals, (11) to obey, (12) to exercise self-control.

(1) Since *regulation* of action is an important phase of moral training, and since unconscious actions influence conscious choices, the preparation for a moral life may begin in infancy. The foundations of morality should be laid by the development of regularity in the more or less unconscious organic processes of

sleeping, eating, and eliminating waste materials from the body. Parents should, therefore, seek to establish regularity in these respects, not only as a condition of health, but as a solid basis for the development of a stable, moral character. Individuals with such habits are not necessarily more moral, but it is easier for them to be so.

(2) As soon as the infant notices the results of his actions, *consciousness* may be utilized in the development of moral habits and the acquisition of moral truths. In doing this one must see to it that right actions are followed sooner or later by pleasurable results to the child, and wrong actions by disagreeable results, because both blind instinct and acute intelligence impel to the repetition of actions having pleasurable results, and the avoidance of those whose results are painful. The child should come to realize a fundamental, though not the highest, of moral truths, "It pays to do right."

(3) The first step in self-control may be taken by getting children to *inhibit*, for a short time, organic and instinctive impulses. An assuring word that causes a child to stop crying for food till preparations for giving it to him are completed, may become a sign to him that if he is quiet, his wants will soon be satisfied, and the time of waiting may be gradually lengthened.

Care must be taken, especially at first, that the interval between assurance and satisfaction is short, or fretting will be renewed, and the word intended to quiet will become instead the signal for a period of crying. The cry of the infant is a most useful, instinctive mode of obtaining parental help, but its function is to attract attention of parents rather than to force them, by its continuance, to respond. The latter function is, however, very readily taken up if a long period of crying is allowed to precede the satisfaction of wants. Moral development is promoted by getting the child to inhibit the crying impulse as soon as possible, by quieting words and prompt relief, if they are to be given at all.

(4) Repressing impulses and *doing disagreeable tasks* should also be encouraged by desirable results following such actions. The child who can be induced to stop crying when hurt, face danger when afraid, or to continue carrying a heavy load when tired, by desire for the approval he will get as a "brave boy," is gaining in moral development When a child can be induced to put forth effort to control self or accomplish any task through the desire to satisfy the competitive instinct by winning, he is also developing morally. If, however, he gains advantages over another, not by effort, but by yielding to the natural impulse to cry and fret about the success or advantages of others (as when jealous), there is a development of undesirable impulses instead of control, and the effect is demoralizing.

(5) As children grow older they should learn that it often pays to *delay* the gratification of an impulse for a time, in order that a greater pleasure may be experienced later. "If you eat now you can have bread only, while if you wait until dinner is ready you may have other things." "If you will keep quiet till I get through, you may then look at this and ask as many questions as you wish." "If you do not buy candy to-day but save your pennies, you can get a doll next week." "If you rest awhile and wait till the others are ready, I think you will enjoy your game more."

(6) *"Work before play and pain before pleasure," is a good motto.* If a disagreeable task is to be performed or pain suffered, in connection with a pleasure or reward, it is always better to have the pleasure or reward last, since anticipation lightens the pain and effort, perhaps even making the act pleasurable, while the pleasure afterward is enjoyed all the more because of the effort by which it was obtained. If the order is reversed, pleasure is lessened by dread, and pain increased by thought of previous pleasure. If every child were led to form the habit of enjoying reward only after earning it, the world would be

vastly happier and better. The pampering and demoralizing tendency to get what has not yet been earned, by going in debt, gambling, or speculating, is the natural result of a childhood that has been allowed to take the sweet first, then dodge the bitter or to take it with much fussing and grumbling.

The underlying truth here is that every sort of satisfaction must be earned or paid for in some way, and the child's experience should impress this truth upon him along with the truth that most is obtained by paying in advance.

(7) The conscious states or *motives* preceding action, as well as those succeeding, are significant from the dawn of volition, and increasingly important as an essential element in moral acts. As soon as an action becomes purposive rather than blindly impulsive, the aim is the satisfaction of some instinct. Since the kind of instincts whose satisfaction is most sought determines in a large measure the moral character of an individual, it is important that the habit of seeking to satisfy the higher instincts should be developed as far as possible, even in early childhood. If a child chooses to gratify the higher social impulse of desire for approval by offering the best to others, instead of gratifying the lower individualistic impulse to take the best for himself, he is forming a most excellent moral habit. If, however, his desire for approval leads him to say what he does not believe, in order to secure the favor of others, the effect is demoralizing.

(8) It must never be forgotten that the *formation of habits* is the important thing in the preparatory stage of moral development, since they will ultimately determine motives and ideals. If none but the lowest motive will produce right action, that motive should be appealed to in order that the right action may be performed. Again, no motive, however high, should be appealed to, if it is certain to fail to call forth right action, because the separation of habits and ideals thus produced is sure to disintegrate moral character. The general rule to be followed is:

Be sure to secure right action even if a low motive must be appealed to, but always appeal to the highest motive that will be effective. If children are forced, without arousing too much antagonism on their part, to do as they should for a sufficient length of time, the tendency to act in that way becomes stronger than to act in any other way. They also come to take pleasure in doing what they have developed a tendency to do, though at first it was not agreeable. On the other hand, if matters are so arranged that right doing always has pleasanter results than wrong doing, right actions are consciously chosen and more quickly become habitual.

Moral progress is measured, not only by increase in the number of right acts, but by increased tendency to perform acts from higher motives. A child who is polite for a long time, through fear of punishment, may remain polite because of the social advantages thus secured. Later, he may be polite to one outside of his circle from the kindly motive of encouraging him, or from a genuine feeling of brotherhood. In this, as in other cases, a habit formed from a low motive may make it possible for a higher motive to be effective. On the other hand, the habit of politeness may be more quickly and firmly established by appeal to the imitative instinct and the desire for approval.

(9) In general, the motives to action may be *ranked* as follows: the pleasurable, as higher than the disagreeable of the same general kind, and the instincts to be satisfied, in this gradation from lower to higher, — individualistic, adaptive, racial, social, regulative. Of course some forms of each of these instincts are higher than some in a class above them; for instance, the social desire for approbation is not only lower than the social desire to be helpful to others, but also lower than the racial desire to care for children; hence, the ranking given above is subject to many changes, according to the form of each instinct involved.

Any substitution of a lower motive for a higher which has

hitherto been effective, is demoralizing. A man is, therefore, degraded by voting even his party ticket for money or by receiving pay for granting justice. Personal service is often unjustly regarded as one of the lowest occupations, probably because those engaged in it are supposed to be actuated wholly by individualistic motives, in performing acts that are, in their nature, social. Keeping a boarding house is not dishonorable, but it is often hard for one who has hospitably entertained friends a great deal, to receive guests for pay without feeling that she is in part doing for a lower motive what she has been in the habit of doing only from a higher motive. Ministers, doctors, and teachers are retrograding morally if they are thinking more of the pay they are to receive and less of the good they are trying to do. Mechanics and merchants are advancing morally as they think more and more of doing their work well and of rendering good service to the world.

Undoubtedly, most acts are performed from mixed motives, but usually one stands out in the individual's mind as the controlling factor. When an individual is consciously acting for a high motive, it is either insulting or degrading to try to make a lower one prominent in his consciousness. To offer for social favors similar favors is all right, but to let another understand that he will gain financially by social favors or by philanthropy is either insulting or demoralizing.

To impute a higher motive to an act that is really being performed from a lower, is sometimes almost equally bad in its effects, because the individual is often thus led to believe that he is really acting benevolently, when his act is wholly selfish. Men who pay a low price for a good supper, therefore, often pride themselves on their benevolence to the church or other cause.

(10) *Ideals* are helpful in childhood in forming habits, but are not usually strong enough to be depended upon to produce right action, except as they are founded on well-established habits

or supported by expectation of desirable consequences. For example, a little girl, with clear ideals as to being helpful, thoughtful, and pleasant, and a genuine desire to be so, rarely holds herself to those ideals a whole day, but did so for over a week, when she thought a promised hammock was not likely to come till she had been pleasant for some time. Unconscious habits of right action, as well as pleasurable results of acting from higher motives, are important factors in the building of effective moral ideals. The training given in the preparatory stage should not be concerned so much with the formation of conscious ideals, which at this time are usually very changeable, as with the habits and feelings that underlie them and make them prominent and effective forces in the next stage of moral development.

(11) *Obedience*, which is regarded by many as the chief virtue of childhood, is important not for its own sake, but for what it involves. It necessarily involves inhibiting and controlling impulses of all kinds, and produces habits of acting according to law. This is important, since in a state or an individual any kind of government or law is likely to be better than anarchy. These advantages result only when the one who enforces the obedience is entirely consistent, for otherwise the advantages of occasional inhibitions are neutralized by the fact that no settled habits of action are formed.

Obedience to *personal* authority is in reality conforming to a more or less artificial environment, and it fits for a useful and effective life in proportion as this artificial environment, which inflicts pain and pleasure for the various acts performed, is in accordance with natural laws and moral ideals. If it results in making good acts painful and evil ones pleasurable, and in hatred for law, it is distinctly demoralizing in its effects, as is also the case when only lower motives for obedience are appealed to. If, on the other hand, the personal authority is consistent and natural, so that obedience involves little more than conformity

to the essentials of the natural environment of the child, the effects are decidedly good, because right habits are more quickly and effectively developed, and natural results that would be too intangible or remote to be effective are emphasized or made real and immediate by substitution. Authority should prevent the child from performing acts whose consequences would be very serious or fatal. If they are immediate, but not serious, he should be warned, then allowed to perform the act and receive the natural consequences. For example, a child should not be prevented from touching something hot, but he should not be allowed to eat poison.

The *person* who exercises authority is also an important addition to the child's environment, and exerts great influence for good or ill by his personality, as well as by the way in which he exercises authority and calls attention to higher or lower motives of conduct.

(12) It should be clearly recognized by every one in authority that obedience is only a means to an end, the end always being *self-control.* Strict control by another, till habits of action are formed, is often, for a young or perverted child, the best preparation for self-control, for it makes his habits his allies, so that he has what he lacked before — the power of controlling himself. Arrest of development, however, always results if the power of self-control is not given a chance for exercise soon after it is developed. Authority should enforce obedience in one field of action after another, and then leave the child free to control the field that has been conquered. Obedience is a temporary and immature virtue, which becomes mature and lasting only when it grows into free self-control, by appropriating outer laws and making them inner standards of conduct.

If children are freed from personal authority, they must as a rule be responsible for the natural consequences of their acts; otherwise freedom is disastrous.

TRANSITION STAGE OF MORAL DEVELOPMENT

Up to about twelve years of age the moral condition is almost wholly the result of environment and training. These may make the child into the semblance of an angel or an imp, yet he can be neither. He is not essentially good or bad, because though his actions have that form, they have not that spirit. Every action is the result of an impulse, a habit, or a choice, which has for its end the pleasure or advantage of self in some way. This is the one law governing the child's conscious action, whatever instinct or motive is involved, and however remote or concealed the advantage to self may be. If well trained, the child has learned to find his pleasure in acts of politeness and kindness, and if ill trained, in rudeness and cruelty; but in either case the action is fundamentally for his own ends, not for the good or hurt of another.

With the dawn of pubescence, however, a new instinct — the racial — emerges. In its very nature this instinct impels to action for others rather than for self. The inner law which says, "Act for yourself," is now for the first time opposed by the law which says, "Act for others." The choice is no longer merely between possible advantages for self, or ways of getting them, but between acting for self or for others. Kind and selfish acts are now, for the first time, morally kind or selfish, for they represent the free choice of actions for self or for others. The individual has begun to live the life, not merely of the individual, but also of the race.

If he has been prepared for this by coöperative games in which he acts for the good of the group rather than for his own exaltation, and if his training has been such that he already has the habit of acting for the advantage of others, then there is no break in the moral progress. Figuratively speaking, the racial instinct infuses life into the moral mechanism, the wheels revolve

more rapidly, and the engineer begins to direct its course according to his own judgment, instead of merely obeying orders or following impulses. The youth is no longer merely an individual, but one of the world's forces, and he feels the obligation, not merely to live, but to do. It is no longer himself and the world, but himself as a part of the world. He begins to feel as never before his own responsibility for that self. The old impulse to get all he can for self is partially replaced by the impulse to *be* all that he can for himself and to *do* all that he can for the world.

This is the age of idealistic imitation and of ideals. Works of art, heroic lives, and religious ceremonies take on a new meaning. Ambitions and ideals are no longer dependent on the immediate environment, but the most beautiful, the noblest, and the highest are chosen from the larger world of history, literature, and art. In the earlier stage of this wider life, the most attractive ideals are frequently very crude. Boys are most appealed to by action, power, and courage; hence not merely history, but all kinds of stories of adventure in which marvels of skill and bravery are shown, are their delight. Such types of character as are here represented are sometimes imitated regardless of the nature of the actions in which they appear.

With girls, there is something of the same attraction toward the strange and wonderful, but the more passive virtues of love and devotion under trying circumstances are most interesting; hence romantic stories are much in favor with girls at this age.

This is a period of change in attitude toward ideals, which are for a while often contradictory and variable. It is a time of transition from personal authority to abstract law, during which there may be considerable lawlessness, especially in cases where control has been entirely external. The rules of the game and the unformulated rules imposed by the customs and public sentiment of the class, school, gang, or society, are usually observed with the greatest care. The social customs of polite

society and fashion in dress are often first despised and flagrantly violated, then respected and most slavishly followed. Laws of state come to be regarded in a different light, and principles of morality take on an entirely new meaning. Laws of all kinds are viewed, not simply from the standpoint of personal interest, but as a part of the larger life of the world now revealed.

MORAL TRAINING IN THE TRANSITION PERIOD

There can be no moral action where the individual does not have the chance to choose for himself; hence, if genuine morality develops at this period, it must be through *self-direction.* The second essential is plenty of *ideals* for imitation; the third, *good companions;* and fourth, wholesome *public sentiment* in school, class, and social circles.

(1) *Self-direction* does not mean that no authority shall be exercised over the youth, but that the authority shall not be merely that of a person arbitrarily dictating and enforcing what the youth shall do. Personal authority, however valuable in a previous stage, especially in the early years, must now be relaxed, and example and advice, preferably in the form of suggestion, substituted. There is never a time when personal authority of parents and teachers counts for so little, and personal character for so much. Arbitrary authority is ridiculed, evaded, defied, or shamefacedly yielded to as unworthy the developing man. At the same time the youth is a most ardent hero worshiper and imitator of what to him is ideal.

Commands and rules should be based on general principles, and should not be numerous or cover minute details of conduct. The youth should be allowed to learn through his own experiences many of the truths of nature and life. This is the time of all others when outer laws should be adopted as inner standards of action, and are likely to be, if they are founded on broad general principles and prepared for by previous training.

Under wise guidance, this is also a favorable time for giving practice in making and executing laws, or, in other words, for the introduction of some measure of self-government. At this age, when personal authority is losing its power, when the attitude toward law is changing, and when principles of action for life are being chosen, nothing will help more in producing regard for laws and a feeling of obligation to obey them, than experience in making and executing them. Responsibility of some kind in which the youth has perfect freedom of choice, but must take the consequences, is the kind of freedom needed, rather than that in which he is free to choose, but is at the same time shielded from the results of his choice.

(2) The *ideals*, early in this stage, must be personal. Reading is their great source at this time, especially for boys. Nearly every boy, however, finds one or more heroes in his local environment, usually in an older man or sometimes in a woman. Some of these may be partial ideals, as of strength or skill or beauty or knowledge; but one is likely to be a moral ideal, the embodiment of all that is noble and worthy. Girls are almost sure to find some such ideal in an older woman, and often the feeling inspired is not unlike that felt later for a lover.

The choice of such personal ideals by youths and maidens cannot readily be directed and controlled, and one can only hope that it will be fortunate. The actions of such chosen demi-gods and goddesses are often, unconsciously to themselves, the source of keenest joy and grief to their admirers, whose whole future life is not infrequently molded by them.

Training in the choice of moral ideals is best given by presenting instances of heroism and virtue in history and story, and dwelling on them long enough to stir admiration but without any preaching. Formal statements and discussion of general principles of morality are also often valuable as giving youths clearer and better standards of action. Care must be taken not to

interfere with freedom of choice by exhortation and urging; for in their very nature ideals must be freely chosen by the individual because they appeal to something within him, and not because somebody else finds them good. The teacher's art consists in presenting them in a form likely to be attractive. If principles of conduct are stated by one who holds a hero's place in the minds of his hearers, or are given as having been practiced by a hero, they are more likely to be accepted than if simply stated and urged for acceptance.

Every youth should have opportunity and encouragement to do something toward carrying out his ideals. If, to do so, he must sacrifice self to some extent, all the better. This is preeminently the time for developing altruism in deed as well as in thought. The youth should now attain to the higher stage of doing right, even when it seems sure not to pay.

(3) *Companions*, especially chums, are chosen by youths and maidens themselves, and only incidentally can the educator determine these choices. Boys more often have a group of companions, and girls a single chum, with whom they wish to be every moment while the intimacy lasts, which may be for days or for years. Associations with these companions may exercise greater moral influence on young persons than association with adults.

(4) The *public sentiment* of school and class, which may be regarded as an emanation from companions, is to some extent under the control of the wise teacher. He should not only know what it is, and make use of it in governing the school, but he should mold it into a finer and nobler form. The general moral tone of a neighborhood, a school, or a society should also be one of the most important considerations in placing a youth, for nothing more surely determines his future character.

II. Religious Instincts

PREPARATORY STAGE OF RELIGIOUS DEVELOPMENT

The credulity and trustfulness of children, and their dramatic and symbolic tendencies during the period of childhood, make it possible to impart to them the *forms* of any religion. Any kind of religious instruction, especially that which involves observing and taking part in religious ceremonies during childhood, leaves a permanent impression upon the mind and heart. The theological beliefs taught may later be utterly rejected by the intellect, as are fairy and ghost stories; but the forms, phrases, and ceremonies still stir the heart.

It is perfectly evident that there can be no *comprehension* of abstract theology during this period, though some sort of crude doctrine or cosmology is needed to satisfy the child's questions regarding causes and reasons. That the deeper religious *feelings* cannot be aroused during childhood is less evident, but scarcely less certain. The child has great capacity for fear and faith, which are important elements in reverence and worship. He also has a strong tendency to love whatever brings him pleasure. What he lacks is the vital element of religion in its higher form, the impulse to self-surrender — the spirit which says, "Do with me as thou wilt." Every instinct of the child says, "Do for me as I wish, and I will love and serve thee." This sentiment, however, is not greatly different from much of that shown forth in the Old Testament, though it is, from the *deeper* sentiment of the Old and New Testaments, and of the sacred books of other great religions.

RELIGIOUS TRAINING IN CHILDHOOD

The training should not be predominantly intellectual, for the child is incapable of forming abstract religious conceptions, and the ideas that he does form are almost sure to change later.

An element of mystery in forms and ceremonies also makes them far more fascinating and impressive to the child than any acts which he thinks he understands. In general, therefore, training during this period should be of the heart rather than of the head, and perhaps even more of the hand, *i.e.*, a training in doing, or, in other words, taking part in religious forms.

The training must vary according to the kind of religion for which the child is being prepared. As a preparation for all kinds of religion, however, the moral training previously described and the cultivation of the spirit of reverence are distinctly helpful.

The religious training of Catholics is a most admirable preparation for that religion which is based on authority. The large number of symbols and the ceremonies suggesting unexplained mysteries, in which the children take some part at stated times, are woven into their life in a way which makes them an indestructible part of it. They are thus prepared for accepting whatever is taught by the embodiment of all this mystery — the church and its priests, who are beings apart from other men.

The religious training of Protestantism is often far less effective, because it seeks to be more intellectual and to teach absolute truths instead of symbols of unexplainable mysteries. It appeals far less to the symbolic and dramatic tendencies of childhood, which are then strongest. Authority of person or book is the basis of teaching, because most of what is taught cannot be brought within the child's experience. Since, however, religion is usually taught as a personal matter, reason is continually appealed to. The child is almost compelled to think and feel, if taught that not the things he does, but his mental states when doing them, are the important factors in religion. In thus ignoring the strongest instincts of childhood (symbolic and dramatic tendencies), and in enforcing authority while appealing to reason, and in trying to make the child subjective instead of objective,

Protestantism has a difficult task, and it is a wonder that it succeeds as well as it does. The changes needed to make Protestant religious instruction more effective during this period are, on the negative side, to cease trying to give children much theological instruction at this time or to make them consciously and subjectively religious, and on the positive side, to give more opportunity for children to take part in whatever religious forms and ceremonies are practiced, to inculcate reverence for sacred things in connection with the development of moral habits.

For this period, the cruder and more objective religion of the Old Testament, and some of the narratives of the New Testament, are far more suitable than the finer and more subjective teaching of Christ and his apostles and of the psalms. Few stories in all literature can be compared with those of the Old Testament as instruments of moral and religious instruction, and their moral value remains, whatever belief is held regarding their origin and literal truth.

Without entering into details, the great thing in religious training before twelve years of age is not to make children religious in the fullest sense of the word, but to prepare them for becoming religious by cultivating feelings and habits which will be in accordance with the religious impulse when it is felt. In doing this, religious conceptions should be left in a crude, plastic form, that they may be molded to fit the broader life of the individual, instead of having to be torn out of the mind and replaced by others, to which early feelings and habits do not so readily attach themselves.

THE PERIOD OF RELIGIOUS AWAKENING

During the adolescent period, when the dawning parental instincts impel the youth to act not merely for self, but as a part of the world and for the good of the world, he is driven to consider not merely laws, people, and institutions, but also the Power and

Intelligence lying back of it all. At this stage, when idealistic imitation is so strong, and impulses of self-sacrifice are stirring the nature of the youth, the Supreme Ideal of power, wisdom, and goodness can scarcely fail to attract him and arouse aspiration and devotion. The vital breath has come, and this is the time of all others for the development of genuine religion; hence, it is not strange that this is the period during which by far the larger number of people become consciously religious. Space does not permit a full treatment of this topic; hence, it must be omitted, or studied in the references cited below.

Exercises for Students

1. Give illustrations of difference among various nations and among different children, as to ideas of right and wrong.

2. Should children be allowed to do a great deal of lunching between meals? Why? Mention several habits not usually considered moral, which may be a basis for moral action.

3. Illustrate how children may be taught that it pays to do right.

4. Is there any moral value in having a child wait until others have been served at the table? Why? Illustrate further how the power to inhibit impulses may be developed.

5. Have hard work and difficult games a moral value? Why? Give specific illustrations.

6. Do children's savings banks have any moral effects? Why?

7. Is there a good psychological basis for the custom of having dessert at the close instead of at the beginning of the meal? A teacher said, "I will read you a good story; then I shall expect you to study very hard the rest of the afternoon." Was she wise? Why?

8. A little girl ate very slowly because she did not wish a visitor to think her greedy. What instinct was uppermost in that case? Give other examples of the conflict of instinctive impulses.

9. Mention some cases in which you think it best to get right habits of action even by means of low motives, and other cases in which higher instincts may be aroused.

10. Indicate whether the following acts were elevating or degrading morally. (*a*) Mrs. Burnett, when a little girl, would not say a certain name

was pretty, though she thought the lady asking her would be very much hurt if she did not. (*b*) A boy took from a dish the largest and reddest apple before passing it to a visitor. (*c*) A little girl who carefully covered a younger sister who had fallen asleep was, upon the return of her parents, given ten cents by her father. The next time her parents went away she got her little sister to lie down and be covered, hoping to get another ten cents. (*d*) People who have been very hospitable, frequently after their neighborhood has become a summer resort, show kindness to strangers for pay only.

Children who are working well in school are sometimes offered a valuable prize for the best work. Is the effect the same when the prize is money as when it is opportunity for further study?

What is the effect of offering a half holiday for good attendance? What of offering a treat such as candy?

Sometimes a child is induced to tell of the misdemeanors of others by threats of punishment or offers of reward, and in other cases the attempt is made to get a child to tell by showing him that the good of the school makes it necessary. What is the moral effect in the two cases?

Bring up for discussion other cases of substituting or mixing of motives and the moral effects of the same.

11. Illustrate the fact that ideals, only, cannot usually be depended upon to govern the actions of young children.

12. Give instances in which natural results are best for children, and others in which authoritative punishment or reward is best.

Give illustrations of temporary authority leading to self-control and of too long continued authority leading to arrest of development.

13. Report from your own experience or observation changes in feeling and attitude toward moral questions early in the teens.

14. Describe the results of experiments in self-government of which you have known, also the effects of having to bear responsibility of any kind either at home or in school.

15. Recall as many as you can of the moral ideals that you formed from the people around you or from reading.

16. Give illustrations from experience or observation of the moral influence of companions upon a child.

17. Indicate some of the ways in which sentiments of honor, truthfulness, and kindness, or other sentiments, may be developed in a school.

Suggestions for Reading

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CHAPTER XIV

DEVELOPMENT OF INSTINCTS — VARIOUS RESULTANT INSTINCTS AND FEELINGS

THE COLLECTING INSTINCT

THIS instinct is clearly manifested in both animals and men. When food and materials for nests and homes are collected and used or stored for future use, the act is of advantage to the individual, and often to the species, as a means of preserving the young. When, however, objects of all kinds are collected and hidden or stored and played with, as is the case with many kinds of animals, there appears to be nothing of immediate value gained by the act. It seems as if the usefulness of certain acts of collecting has led to an unspecialized tendency to collect objects of all kinds.

In human beings the instinct is very strong, and as a result, not only have we museums of all kinds, but nearly every individual has at least one collection of some sort.

This instinct unites with other instincts in a way which makes it impossible to determine its actual strength. It is closely related to the instinct of ownership and to that of exercising personal power. The amassing of wealth, which is an indirect way of collecting food and shelter for self and descendants, is probably often due as much to the blind impulse to busy one's self in collecting, as to the desire for money and what it will buy. The instinct is often associated with the play instinct, since the objects collected are frequently an important source of amusement. Curiosity not infrequently contributes to the impulse,

as does also the tendency to construct. Competition with others greatly increases the activity. The æsthetic tendencies are also often gratified in the objects collected and their arrangement.

In children the instinct is manifested to some extent in the second year, especially in connection with play, sticks, stones, etc., being collected and kept as playthings. It continues all through life, and varies not so much in intensity at different ages as in the objects with which it is concerned and the conscious motives with which it is associated. In children, especially when there is no conscious motive for the act, the impulse is extremely variable. Objects of a certain kind may be collected and guarded with the greatest eagerness, as if life depended upon their possession; then in a few days, or perhaps a few hours, they may be abandoned, thrown away, or destroyed. The sight of some one else appropriating objects, or anything which suggests the idea of securing possession of objects, is sufficient to arouse the collecting impulse, while the awakening of another interest changes the form of the impulse or causes its disappearance for the time being; yet entirely useless collections of glass, stones, etc., are sometimes preserved for years.

When the instinct is associated with some other instinct, such as the individualistic, the competitive, the imitative, the æsthetic, or that of curiosity, the impulse manifested in a certain line in childhood may continue for months or years, or even all through life. Thus a passion for collecting may develop into love of money or even miserliness, or into love of winning in any kind of contest and the collecting of trophies, or into the pursuit of an artistic or a scientific career, with the collection of evidences of success.

The elements which make collections, or objects in a collection, desirable are, according to the reminiscences of Barnes's pupils, variety, quantity, rarity, beauty, and personal association or ownership. The reasons given for making collections are emu-

lation, imitation, pleasure of ownership, and of classifying or arranging.

The instinct has already been utilized to some extent in school, but there are undoubtedly much more extensive and fitting uses yet to be made of it. The educational value is not so much in what is collected as in the physical, mental, and volitional activity called forth directly or indirectly while collecting. In general, children desire many things, while older persons desire the rare ones which few other people can possess.

THE CONSTRUCTIVE INSTINCT

The general tendency to construct things is largely the outgrowth of that form of the racial instinct which causes suitable places to be prepared for the shelter and protection of the young. Some constructions, however, are means of promoting individual ends as well, such as obtaining food or shelter for self, *e.g.*, webs by spiders, holes by ground hogs. In animals the tendency does not seem to be generalized, but is manifested only in constructions which are characteristic of and useful to the species. In man, however, there seems to be an impulse to construct, independently of any end to be gained.

From the time the child begins to pile up sand or blocks, through the ages when boys construct tools and dig caves, and men design temples, bridges, business blocks, and balloons, the constructive instinct is prominent. There is a peculiar pleasure accompanying these acts of construction, perhaps because one feels and perceives in concrete form the evidence of his power to do, to modify and change.

The destructive tendency is probably only a modified form of the constructive, for it gives the same evidence of power to change. It is often more attractive to children because destructive changes can be produced so much more quickly and easily than constructive ones. The destruction or displacement of

something is also often merely a preliminary to the construction of something else from the parts or fragments that are being made. Children frequently break or take apart complex toys and make some crude thing in which they take great pleasure.

The constructive instinct naturally associates itself with the adaptive instincts of imitation, play, and curiosity, with the æsthetic and expressive instincts, and sometimes with various other instincts and motives.

Imitation and suggestion are the natural stimuli to this impulse. Like other forms of play, it needs to be spontaneous and free. Definite directions as to what shall be constructed, and how it shall be done, often effectively inhibit the constructive impulse.

The order of development of the impulse is from the more concrete and tangible to the more immaterial and symbolic. Making things, therefore, naturally precedes making pictures of them or compositions about them. In general, the manual element is naturally most prominent in early constructions, and the artistic and literary in later. At present, children are often guided and drilled in artistic and literary creation before they care much about that phase of construction, and are not given sufficient opportunity for manual work till many of them have partially or wholly lost their interest in making things.

THE ÆSTHETIC INSTINCT

The biological value of this instinct is not easily discerned. It is most satisfactorily explained as a resultant tendency rather than as a primarily useful instinct. The idea that insects select flowers which are beautiful for fertilization, and hence such flowers survive, and that animals select the mates most beautiful in appearance and action, and thus promote the development of the beautiful, leads to the rather absurd conclusion that all the beauty of organic life is the result of the good taste of the lower

animals. The more reasonable view is, that the qualities of plants or animals which attract insects and mates, or favor avoidance of enemies, are preserved by natural selection. In other words, the useful survives. It becomes agreeable according to the general law of accommodation by which every organ of every animal comes to respond in the most favorable way to every impression that is often repeated. Leaves and grass are green because the elements favoring plant growth give them that color, and green is pleasant and restful to the eye because in the course of ages the eye has become accommodated to green. For a similar reason we find grace and beauty in nearly all forms of life and action.

Although the æsthetic reaction is in a large measure playful (the product of the excess of life above what is necessary to its maintenance), yet it is always closely associated with the useful from which it has evolved. Anything suggesting want of equilibrium or strength fails to appear beautiful because such objects have not been useful, and hence not numerous and permanent enough to result in favorable accommodation to them. Symmetry and a position in accordance with the law of gravity are therefore universal elements of beauty. For similar reasons harmony of parts and unity of the whole is a universal requisite of beautiful objects. The elements of beauty which are associated with universal laws of existence and permanency are therefore responded to in approximately the same way by all nations of people.

Those associated with local characteristics and customs, on the other hand, are responded to differently by each nation, tribe, and community. For example, the peculiar blues of Scandinavian art are not so much enjoyed by people of other countries where they are rarely found in nature. Our music, also, is as painful to the Chinese as is theirs to us.

Recent experiences make wonderful changes in the æsthetic

reaction. Even in the same community the beautiful sleeves or hats of last year are "horrid" a year or two later. What is common for temporary reasons, as well as what is common because constantly useful, comes to be regarded as beautiful; hence, beauty is in part a matter of style or custom.

Since the experience of each individual differs from that of every other, each person has also, in a measure, his own standards of beauty. Purely personal associations aroused by an object sometimes have more influence upon one's judgment than the more universal and fundamental elements of beauty.

Standards of beauty are, therefore, partially determined by universal laws of use and beauty, partially by local surroundings, customs, and style, and partially by individual peculiarities of temperament, experience, and training.

The æsthetic instinct is closely connected with several other instincts. Whenever certain forms of the play impulse are clearly marked, either in animals or children, there is some ground for believing that there is a crude form of æsthetic appreciation. This is especially true of all playful exhibitions by animals, of form, color, movement, and voice, by which they and their companions, especially mates, are pleased. Such acts of showing off and of adornment are common among all savage tribes and are very characteristic of children. Their real purpose is, however, to attract attention, and it is not certain that any animal below man has æsthetic feelings.

The æsthetic impulse is thus a form of the play instinct and closely associated with the racial and social instincts. It is not less closely associated with the rhythmic, dramatic, constructive, and expressive instincts. The joy of doing always culminates in the pleasure of contemplating the beauty of the product or performance. The impulse to express mental states also attains its highest form when the expression itself is beautiful.

The development of the æsthetic impulse is greatly influenced

by the instincts with which it is associated. It cannot, therefore, reach its deepest and broadest development until after puberty. In early childhood the æsthetic sense is largely sensory; color, sound, and rhythm being the most effective stimuli. Beauty of form, harmony, and unity become more important as the mind develops and standards are formed by habit and training. Colored pictures and those with subjects interesting to young children therefore appeal more to them than the most artistic black-and-white pictures.

Vocal skill and auditory appreciation develop much earlier than manual skill and visual appreciation (except in the case of colors). Children enjoy rhythm, melody, and the act of singing much sooner than they appreciate symmetry of form, unity of design, and the power to make beautiful forms. Lancaster's investigations show that, on the average, great musicians achieved their first success at nine or ten years of age; while artists have not obtained corresponding success until about eighteen years of age.

That the æsthetic instinct should be developed is admitted by all, but there is difference of opinion as to the best method. Should only the highest art be shown children, even though they do not appreciate it, or should they be allowed to revel in bright colors and sharp contrasts until their æsthetic appreciation becomes less crude? It is of no use to place before them high art which excites no interest or feeling, and, on the other hand, continued association with crude and imperfect art develops wrong standards. Nature gives the best models because universal laws of beauty are shown in every flower, leaf, and twig. Other models for children should be chosen, first, because they exemplify fundamental laws of beauty; and, second, because they have qualities which will attract the attention and arouse the interest of children. Great works of art which appeal to children because of their color, or the subject represented, will

mold their taste; while those that fail to attract their attention will have little or no influence. Care should, therefore, be taken that pictures in the schoolroom are both artistic and interesting.

THE MIGRATORY INSTINCT

In its primitive form this instinct is probably nothing more than a manifestation of the general tendency to act so as to increase or get more of a favorable stimulus already received. At a certain season of the year, salmon, for example, experience bodily changes preparatory to the production of young, which cause them to move so as to get into an environment more and more favorable to their present bodily state as regards temperature, chemical condition, etc. The result is that after many days they find themselves in the fresh water where they were hatched years before.

This is the fundamental form of the instinct which makes every animal, including man, experience an impulse to migrate when, through changes in himself or his surroundings, he is out of harmony with his environment. The impulse is felt in the spring by nearly every one in a greater or less degree. Some persons, such as tramps, pioneers, and travelers, never become so firmly settled and accommodated to any environment that they do not yield to the migratory impulse.

Children of two or three years nearly always have a period of running away. Later, the impulse to play truant from school or to leave home often comes, and is frequently acted upon without conscious purpose or reason. The impulse is especially strong during the period of adolescent changes, and if there is not actual running away, there is at least a strong desire to travel. Special causes of discontent often bring on or increase such impulses.

THE RHYTHMIC INSTINCT

The universal tendency to rhythm in action may be considered under the head of instinctive tendencies, though it is really an organic and automatic tendency even more fundamental than an instinct.

Rhythm is a marked feature in physical phenomena as well as in plant and animal life. In man, all bodily processes are rhythmic, and all repeated movement tends to take a rhythmic form. It is not surprising, therefore, that consciousness is rhythmic. There are rhythms of attention, activity is followed by rest, and one emotional extreme is succeeded by its opposite. Consciousness even makes rhythmic what is objectively without rhythm, as when continuous and uniform beats of a metronome are heard as rhythmic beats.

The more instinctive form of the rhythmic tendency is shown in the impulse to produce rhythmic movements and sounds, and to appreciate or respond in a particular way when such rhythms are produced by others. Both of these tendencies are manifested in the first few months of infancy. The tendency remains much the same all through life except that the rhythms become more complex. The rhythm of conversation, music, and poetry is often appreciated long before the other elements of which they are composed. Mother Goose rhymes and some of Tennyson's finest poems are enjoyed by children for exactly the same reason, *i.e.*, their rhythmic character. Many games also owe their charm to the opportunity they afford for rhythmic sounds and movements.

RELATION OF INSTINCTIVE ACTIONS TO FEELINGS

In general, an instinct, as Professor James says, is a tendency to act; and an emotion, a tendency to feel. Since most instinctive actions are at least occasionally accompanied by feeling,

there is an emotion for every instinct. Every emotion has also its appropriate bodily expression which varies somewhat from the corresponding instinctive action.

The tense muscles, labored breathing, pale or flushed face, quickened heartbeat, and irregular movements of *anger* are only partially reproduced in the purely instinctive movements of fighting. The act of fighting is exhilarating and pleasurable, while anger, especially when it takes the form of irritation and hate, is rather painful and depressing. Anger appears whenever an action of any kind is interfered with, as is clearly shown in young babies. The resulting irregular, varied, and vigorous movements often overcome the interference, and fighting movements are probably the result of the selection of the most favorable of these. When the stimulus to action continues without the obstruction being removed, irritation or sullenness and smoldering hate of the cause of the interference are likely to result.

Jealousy and envy are produced by the sight of another enjoying the pleasure given by a loved being or a desired object. These emotions seem to be experienced by nearly all species of animals and are usually especially prominent in children. The tendency to them remains strong all through life, but is suppressed and covered up by training and social convention.

Humorous emotions are, in nature and cause, the opposite of those of anger. Instead of interference with activity, when the sense of humor is aroused, there is a sudden opening of a channel of free activity. Any sudden stimulus giving rise to playful movements is likely to arouse the emotion in young children and perhaps in animals. The delight of children in "peek-a-boo," and in all play in which there is a sudden transformation which may be accompanied by laughter and sudden movements of head or hands, running, etc., indicates the early rise of this emotion. When a child of less than two suddenly turns his head

away from the one he has offered to kiss, and runs off laughing, the presence of humor is unmistakable. In general, humor is the result of a more or less serious form of physical or mental reaction being suddenly converted into a playful form. Naturally, therefore, humor and pathos are often associated, and "there is only a step from laughter to tears." Humor is a permanent emotion, as play is a permanent instinct, but it is stronger in childhood than in old age. The stimuli to humor, like the forms of playful activity, vary greatly with age. The child's humor is often nonsense to the adult, and the adult's, incomprehensible to the child; but whenever they can play together they meet on a common basis.

Humor should be regarded as belonging to the same class as the æsthetic instinct, and the same attention given to cultivating and refining it. A keen sense of humor is one of the essentials of a good teacher and she does well to encourage pupils to see the humorous in life and in literature.

The tendency to tease is an instinctive form of humor which needs more careful study by educators. In general it leads to a lower form of humor and is often the source of many quarrels which the parent or teacher may have to settle. On the other hand, teasing has a value in that the fear of being laughed at is one of the strongest social and even moral forces in every social circle.

The emotions of *awe* and *reverence* are accompaniments of reactions which involve little or no movement because there is no movement suited to the stimulus which arouses them. The object arousing the emotion is impressive but not exciting, and there is no fitting motor response except the more or less complete inhibition of movement. It is related to that form of the fear instinct in which safety is gained by keeping still; but the object is less definitely fearful, and is attractive rather than repulsive.

RELATION OF FUNDAMENTAL STIMULI TO FEELINGS

There are many kinds of stimuli which have affected the development of intelligent action in animals and men from the earliest ages. Heat and cold, fire and frost, light and darkness, the clouds and heavenly bodies, water and earth, trees and flowers, birds and animals, heights and depths, open and closed spaces, feathers and fur, eyes and teeth, etc., are some of the more or less constant stimuli which mold mind in the race and the individual. A large amount of data regarding the feelings and ideas excited by these phenomena of nature has been collected from folklore, reminiscences of adults, and observation of children, under the direction of Dr. Hall. This material is very interesting and suggestive, but exceedingly diverse. This is probably to be expected, since the favorable or unfavorable character of these phenomena varies with the species concerned and with various conditions, surroundings, and experiences of species and individuals. Thus water or fire may be fascinating to one, terrifying to another, and tranquilizing to a third, or each of these to the same individual, when appearing in special forms.

It is evident also from descriptions, and from well-known laws of association, that many of the emotions excited by these stimuli are the result of early experiences of the individual with such stimuli, or of the influence of the words and actions of adults in connection with them. It is utterly impossible from the studies thus far made to say how far these mental states or "psychoses" are due to hereditary racial experiences and how far to individual experiences in connection with social heredity.

The nature and development of the emotional life of man can never be understood till we have learned more regarding the universal effects of instinctive actions, and of the more constant and universal stimuli, upon mental activity and feeling. Many years must elapse before such knowledge can be obtained.

Exercises for Students

1. Report full details of one or more collections which you have made. Give some specific illustrations of the way in which the collecting instinct may be utilized in education. Are ready-made collections of as much value as pupil-made collections? Is it of any advantage to children to make scrapbooks?

2. A boy of four worked a considerable part of two days constructing a tool box out of laths, and a very restless little girl worked steadily for two hours sewing on a dress for her doll. What does this indicate? Give a number of illustrations of ways in which the constructive instinct may be utilized in the different grades in the school.

3. Report instances where children have been greatly affected by what they regarded as very beautiful or ugly. Mention various ways in which the æsthetic impulse may be cultivated directly and indirectly in school.

4. Give illustrations from your own experience or observation of the strength of the migratory instinct. May mental changes be made to take the place of physical ones, *e.g.*, imaginary journeys for real ones? Illustrate.

5. Give illustrations showing the strength of the rhythmic tendency, and show how it may be utilized in school.

6. Give illustrations of the instinctive basis of various emotions.

7. Reminiscences and observations regarding the influence of light and darkness, and perhaps of other stimuli, should be reported.

Suggestions for Reading

On children's collections, read Barnes, *Studies*, Vol. I, pp. 144–146; C. Frear Burk, *Ped. Sem.*, Vol. VII, pp. 179–207; Groszmann, *Jr. Ch. and Ad.*, April, 1901, pp. 377–385.

On the constructive instinct, see Small, *Am. Jr. Psych.*, Vol. XI, pp. 152–153; and on its use in education, see Dewey, *The School and Society.*

On æsthetic feelings, see Ribot, pp. 328–367; Scott, "Sex and Art," *Am. Jr. Psych.*, Vol. VII, pp. 153–226; Harris, *N. E. A.*, 1897, pp. 330–338; Chamberlain, pp. 173–189; Sully, chap. ix; Brown, "Art in Education," *N. E. A.*, 1899, pp. 112–121.

On migratory impulses, see Kline, *Ped. Sem.*, Vol. V, pp. 381–420; *Am. Jr. Psych.*, Vol. X, pp. 1–81; Dinsmore, *N. W. Mo.*, Vol. IX, pp. 183–186; Brooks, *Pop. Sci. Mo.*, Vol. LII, pp. 784–798.

On rhythm, see Bolton, *Am. Jr. Psych.*, Vol. VI, pp. 145–238; Sears, *Ped. Sem.*, Vol. VIII, pp. 3–34; *Am. Jr. Psych.*, Vol. XIII, pp. 28–61.

On various impulses and feelings, see Burk, "Teasing and Bullying," *Ped. Sem.*, Vol. IV, pp. 336–371; Bolton, "Hydro-Psychoses," *Am. Jr. Psych.*, Vol. X, pp. 169–227; Hall, "Tickling and Laughing," *Am. Jr. Psych.*, Vol. IX, pp. 1–41; Hall and Smith, "Reactions to Light and Darkness," *Am. Jr. Psych.*, Vol. XIV, pp. 21–83; Hall and Brown, "Fire, Heat, Frost, and Cold," *Ped. Sem.*, Vol. X, pp. 27–85; Hall and Wallin, "How Children and Youth Think about Clouds," *Ped. Sem.*, Vol. IX, pp. 460–506; Ellis, "Fetichism in Children," *Ped. Sem.*, Vol. IX, pp. 205–220; France, "Gambling Impulse," *Am. Jr. Psych.*, Vol. XIII, pp. 364–407; Chamberlain, chap. vii; Small, "Methods of Manifesting the Instinct for Certainty," *Ped. Sem.*, Vol. V, pp. 313–380; Phillips, "The Teaching Instinct," *Ped. Sem.*, Vol. VI, pp. 188–245; Arnett, "Origin and Development of Home and Love of Home," *Ped. Sem.*, Vol. IX, pp. 324–365; Lindley and Partridge, "Some Mental Automatisms," *Ped. Sem.*, Vol. V, pp. 41–60.

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CHAPTER XV

DEVELOPMENT OF INSTINCTS — THE EXPRESSIVE INSTINCT

ORIGIN, NATURE, AND FORMS

THIS instinct belongs with the resultant and miscellaneous group because it owes its origin to various other instincts. Expression is a means of frightening enemies and communicating with friends regarding food and danger; consequently it has been developed in the attainment of individual, racial, and social ends.

In the lowest animals, expression, so far as there is any, is accomplished by means of feelers or antennæ (notably in the case of ants), but in higher animals the chief means are sounds. Most mammals and birds have from two or three to a dozen different calls which are appropriately responded to by others of their species. In man, the expressive instinct reaches its highest development because of his social nature and the perfectness of his vocal organs, and also because of the complexity of the mental states to be expressed. Instinctive emotional expression and expressive gestures are so effective that savages, without a word of artificial language in common, can communicate more accurately than any of the lower animals.

Man is not limited, however, to the language of natural signs. Every race has formed an artificial language of arbitrary symbols. Animals, on the other hand, have no artificial speech, and only a few of them can use such language even in an imitative way. In man, the need for communication is so great, and the instinct

of expression so strong, that children who had never heard any language would probably form a crude one suited to their needs. The fact that children who hear but little spoken language, sometimes, as Horatio Hale has shown, form a language of their own, is evidence of this. Again, children of nearly the same age, who play together a great deal, sometimes form a language of their own in spite of the fact that they are surrounded by other persons who are talking a good deal of the time. Many children also invent new words, notwithstanding the fact that they continually hear a fully developed language.

Since any means by which the mental state of one being is expressed to another is a language in the broad meaning of the term, words may be tactual, motor, or visual, as well as auditory; and ideas may be expressed in the permanent form of some constructed object or representation, as well as temporarily by sound, touch, or gesture. Constructive activities of all kinds are important forms of expression; but we shall take space to discuss in detail only the forms in most general use; namely, (I) Auditory Symbols, (II) Visual Symbols, and (III) Drawings.

I. Auditory Expression

FACTORS CONCERNED

The primitive form of the expressive instinct is shown by both animals and children in suggestive sounds and movements which are responded to by companions in appropriate ways. These are more numerous and well developed in animals living in groups than in others, although some are useful to all those animals which care for their young and for those that seek mates. The crow, which is much of the time with others, probably has as many as a dozen expressive calls. Monkeys, which always live in groups, have, according to Garner, many more. Children add considerably to their native endowments in this respect

before they learn an artificial language, and make a good deal of use of this natural language in learning to understand and use an artificial one.

Besides their special endowments in this direction children have a more general instinctive tendency to expression which is based perhaps in part upon a tendency to respond to all stimuli by movement of some kind and by a tendency for mental excitement of all kinds to find some motor outlet. This results in similar responses to similar objects and states and these responses become expressive. The sound "bow-wow" comes to mean any dog, just as certain movements indicate anger or fear. The usefulness of the expressive instinct is not in the movements themselves, but in the responses they cause companions to make.

The first factor in modifying and developing the expressive instincts is play. Before learning to talk, and sometimes afterward, children frequently use their vocal organs as playthings, and thus develop their vocal centers in preparation for the production of any sound they may subsequently have occasion to use. Later, children often combine and substitute words in various ways, as a matter of amusement.

The second most important factor in producing a vocal language is the *imitative instinct.* This leads to sounds and gestures being responded to by similar sounds and gestures. These naturally arouse corresponding ideas in other persons, and are therefore often repeated and learned. They are then used for other similar stimuli, and thus they become words and a means of classification of objects. The use of "tree" for certain kinds of objects, "flower" for others, and "animal" for others causes the common characteristics of each class to be noted more carefully, and the general notion or concept of it is thus perfected. Other symbols are used to indicate sensations and qualities as well as objects and acts. Often they are also

applied to analogous and associated objects. Not only knives are "sharp," but pains, vinegar, and wits. "Kitty" meant to M. not only the animal, but anything that was soft to the touch, and finally anything that was pleasing.

In the case of a child surrounded by people speaking a vocal language, imitation is the most important factor in his language development. The child has continually before him examples of persons responding to stimuli by words only, and the imitative instinct leads him to respond in the same way. He is much more likely to imitate a response than an original stimulus, though sometimes the child who has not been taught the word "dog," for example, will say "bow-wow" when he perceives or pictures the animal; but with equal opportunity to hear a dog bark and hear the word "dog," he is likely to adopt the sound used by others. For this reason each child, no matter what his nationality, learns the language he hears spoken. Deaf children are usually slow in learning visual language as well as auditory; but not so much because hearing is necessary to language learning as because they are deprived for many years of the chance to imitate any artificial language.

Necessity, which really means action for one's good, or conformity to the fundamental individualistic instinct, is another important factor in the individual language development, as it was perhaps the chief one in the development of language by the race. The child who learns to understand words of warning or approval succeeds in avoiding various painful stimuli and in securing pleasant ones. Similar results come from ability to indicate hunger, and objects of fear or desire. If a child is helped to what he wants in response to the language of natural signs, he is often slow in using conventional language; hence, it is sometimes well for parents to refuse to understand the wants of children old enough to talk until they try to express them in words.

Another more obscure but very important factor in acquiring

language is the instinctive *social* tendency to wish for sympathy and approval. This is also really a phase of the expressive instinct itself. Children seem especially desirous that others shall hear, see, and feel what they do, as well as that they themselves shall have the same experiences that others are getting. Language is one means of sharing experiences; hence, it is used a great deal for that purpose. Children often repeat over and over a statement to make sure it is comprehended, and cease only when they receive assurance by word or act that they have been understood. Language is the chief medium by which the wider social life is brought to the individual soul, and by which he infuses his own mental states into the thoughts and feelings of the group to which he belongs. All impulses to communicate, whether to engage in the most trivial gossip or to give expression to the profoundest feelings and thoughts, are the result of the social tendency to share one's experiences with others of his kind.

STAGES OF LEARNING ORAL LANGUAGE

Instinctive stage

The instinctive language which man has in common with the lower animals is that of emotional expression. He begins life with a cry and often ends it with a moan. This language of natural signs is not learned by the individual, but is instinctively understood and used by all races.

At first the child has no cry except for discomfort, and little or no variation in its cry to express different kinds. Soon, however, the cry of anger or the wail of disappointment is differentiated from the cry of physical pain. At about the same time, or a little later, other cries, screams, gurglings, and cooings, suggestive of energy or pleasurable contentment, are made. Differentiation in vocal expression probably proceeds more rapidly than differentiation of the different forms of emotion, since

emotions are probably, in part at least, the result of what is called their expression.

Children only a few months old are sensitive to emotional expression of others, and may be soothed, irritated, or depressed by appropriate tones of voice. Vocal laughter, however, is sometimes rather late in appearing in children and correspondingly late in being understood. One little girl was well along in her second year before she laughed aloud, and until she herself laughed was disturbed and even frightened by the sudden laughter of others.

Besides the purely instinctive language of emotional expression, there is usually developed in the second year a more intellectual language, which prepares the way for purely symbolic language. The child learns to vary the tone of his grunts and squeals so as to express fear, surprise, question, desire, satisfaction, and assent, and he associates gesture with these variations in tone. Soon, therefore, he can express, to one quick to interpret, nearly all his feelings, ideas, and wishes. All through life, tone of voice, emphasis, inflection, and gesture continue to be effective aids in expression, and important means of interpretation, especially of whatever concerns the emotions.

Since the child's life is more emotional than intellectual, this form of language is peculiarly appropriate in communicating with him. After he begins learning artificial language, the instinctive language of tone and gesture remains an important means of communication, and an effective aid in interpreting what is heard. A child may be commended in tones that will make him cry, or condemned in accents that will cause him to smile with pleasure.

Playful and imitative stage

This stage of language learning does not take the place of the preceding stage, but is added to it. Beginning in the second

quarter of the first year, it is usually prominent for from one to several years. In the second and third quarters of the first year, the vocal organs of a child are his most important playthings. During this period of babbling a child may make nearly every sound in the language.

In the last quarter of his first year, babbling often gives place to imitation, and instead of repeating chance sounds over and over, the child reproduces nearly every sound that he hears. Sometimes this is done almost automatically and with phonographic exactness. In other instances the imitations seem to be more voluntary from the first, since the child keeps trying to utter a word, with varying success, until he gets tired or succeeds in speaking it satisfactorily to himself.

Sometimes this imitative stage is almost, if not entirely omitted, as was the case with M. The "da da," or purely playful use of language, was very inconspicuous in C. One or more phases of language learning are, therefore, sometimes omitted entirely or subordinated to others.

Quite frequently the child imitates tone, inflection, and rhythm before attempting to articulate separate words. Sometimes so perfectly is this done that a person in another room is led to believe that a conversation is being carried on. Evidently in such cases, tone and rhythm are most impressive to the child, and the motor adjustments for their imitation most easily made.

Word-learning stage

As soon as a child begins to utter sounds for some other purpose than the mere making of them, the stage of word learning proper is introduced. Frequently the playful and imitative utterance of words is intermingled with their use for a purpose, in a way that is rather puzzling to adults. This word-learning stage may begin in the first year, but is not usually very marked till the last half of the second year.

Usually, children understand words before they speak them; but in cases where the imitative stage is marked, many words are uttered before their meaning is known. The meaning of words applied to objects and acts is learned by hearing them in connection with the perception of object or act; yet even these words are understood not so much by their sound as by means of the circumstances and the gesture or glance of the eye which accompany their utterance. It is therefore difficult, before a child begins to talk, to tell what words he really knows. He is often greatly puzzled by a familiar word uttered without the usual suggestive conditions, or, if they are present, some other word may have the same effect as the right one. A child who had often been told to "lie down" when she sat up after being put to bed, would lie down if the words "sit up" were substituted, but uttered in the usual tone of voice and with the usual glance.

The child is always liable to associate a word with a different characteristic from the one intended. To one little girl, "chair" meant not so much the article of furniture as the act of sitting, and to another, "quack" meant not only a duck, but the water in which it was seen.

Pronunciation of words which require very accurate adjustment of muscles is a difficult task in the early stages of word learning. The power to understand words is usually more quickly gained than the power to control the vocal apparatus. Some children do not try to use words difficult of pronunciation till long after the meaning is perfectly familiar to them. Thus M. refrained from saying "grandma" for about a year after she knew the word. Most children, however, are not often deterred from trying to use words by inability to pronounce them correctly.

The question of pronunciation is simply one form of the general problem of how voluntary motions are acquired. Some sounds, and especially some combinations of sounds, are difficult of utter-

ance for adults as well as for children; hence, it is not easy to separate the childish difficulties from other difficulties of the language. A study of the first sound of all the words used by children will show that words beginning with certain sounds, such as *th* or *r*, are not so well represented as those beginning with other sounds, such as *t* and *b*. This may be interpreted as showing that words beginning with difficult sounds are avoided. To mean anything, however, the prominence of those sounds in adult language must be considered. A study of the sounds mispronounced, especially of those at the beginning of words, and of sounds substituted for those presumably more difficult of pronunciation, therefore, may be more significant. The difficulties, however, of getting accurate records of children's pronunciations (many of which are intermediate between sounds recognized as elementary by adults) are so great that one does not feel sure of the data. The errors and substitutions change also with age, and vary greatly with individuals. Presumably there is some law of variation with age corresponding to the natural order in which the centers controlling the vocal apparatus develop, though the course of development must be greatly modified by individual training and experience. Common observation indicates that this order is from large, comparatively free, to finer and more definitely controlled movements involving accurate coördination of the several parts of the vocal apparatus.

The fact that sounds are difficult not merely in themselves, but according to the sounds with which they are associated, makes the question of the natural order of development an exceedingly complex one.

Habit and the relation of one center to another also modify the natural order, if there be one, to such an extent that its determination is very difficult. As soon as a new word is learned there is a tendency to assimilate other words to it; hence, the pronunciation of any word is likely to be modified by some other

word which has recently been learned or often pronounced. Thus Mrs. Moore's boy, who used "ama" for "grandma," used "appa" for "papa," and after learning "ba ba" for "baby," changed to "pa ba," and after using "be be" for "baby," to "pape," and then finally to "papa."

Again, pronunciation is a matter of auditory perception and memory as well as of motor development. As a consequence, words are often mispronounced because the child does not discriminate sounds accurately, and still more often, because he discriminates sounds just as they are pronounced by adults, instead of as they should be. Most adults slur certain sounds, and the child naturally reproduces only the accentuated portion of the words he hears, or fills out the word with sounds already familiar to him. For example, a child who had been singing a familiar hymn suddenly stopped, and said, "What is a consecrated cross-eyed bear, anyway?" The first or last or most impressive syllable only of a long word is often used because it is most noticed and best remembered.

The rate at which children overcome the difficulties in the way of learning to understand and pronounce words becomes more, rather than less marvelous as it is studied. Records of children's vocabularies, which have multiplied greatly within the last few years, show that children of two or three years actually use more words than adults were formerly supposed to use. From thirty to a hundred new words a month is not an unusual rate of learning after the acquisition of language fairly begins.

Children rarely learn to walk and to talk at the same time. When, as is usual, walking precedes talking, the language-learning stage is not generally marked till the last half of the second year. At two years of age a child's vocabulary may not exceed a score of words; but is likely to number from two to four hundred, and may reach the surprising figure of ten or fifteen hundred.

The rate of acquiring words between two and four years of age varies with the degree of interest in learning as compared with interest in combining words already known, and with the waxing and waning of interest in other forms of motor activity, such as walking or building with blocks. The child's vocabulary may therefore increase very rapidly for a month or two; then remain almost the same for a time, while facility in the use of the new words is gained, or while interest is temporarily occupied with objects and acts, rather than their names and descriptions.

As to the kind of words most learned by children, close study shows that the supposition that nouns especially appeal to them is wholly wrong. At two years of age the proportion of nouns in children's vocabularies is about the same as in the language, viz., 60 per cent; but the proportion of verbs is about 20 per cent, or nearly twice what it is in the language. Adverbs are also relatively more numerous than adjectives. These facts harmonize with other studies, showing that children are more interested in actions than in things. Adjectives and verbs are often learned first, yet nouns seem to predominate during the first months of speaking, when the per cent may be 70 or 80. In reality, however, the noun idea is not so prominent as this, for words that in adult language are nouns, are to the child verbs, or else the distinction is not yet made. For instance, M. used "bed" in the sense of lie down, just as we use "dress" to mean the act as well as the object. Prepositions also are at first for the child nearly always verbs, "up" or "down" signifying the act rather than the position.

Sentence-making stage

Groups of words, *e.g.*, "da 'tis" (there it is), are sometimes learned before single words; but words learned separately are rarely combined until they have been used separately for some time. The stage of word learning gradually merges into the

stage of word combining, and a close observer will usually discover that a time comes when a child is more concerned with the combination of familiar words than with the learning of new ones. This stage is apt to become prominent in the third or fourth year.

The single words that a child uses are, in a way, sentences, especially when expression is helped out by tone inflection and gesture; *e.g.*, "papa" means "Papa has come," "I want my papa," "That is papa," "Papa will do it," "I will give it to papa," etc.

An exact report of what a child just beginning to combine words says, is surprisingly unintelligible to one knowing nothing of the child, or the circumstances and tone of voice accompanying the words. Only that portion of a thought which is accentuated in the child's mind or seems to need statement is put into words — all the rest is understood from the circumstances or expressed in some other way; *e.g.*, "Little story" means "Tell me a little story."

Progress in sentence making is the result of three processes: (1) the substitution of words for what is understood or indicated by tone or gesture; (2) analysis of situations into separate elements which then are expressed by words; (3) increase of mental grasp so that the relation of different elements to each other is held in mind, and words selected and arranged to indicate that relation.

The shifting of interest and attention from the objects concerned in an act to the actor or the action, evidently calls attention to the elements of a situation and leads to the attempt to name the various elements and their relation. Adverbs, adjectives, and prepositions are the result of attempts to express the less important phases of thought and their relations, *e.g.*, "Get bed papa" becomes later "I want to get in bed with papa."

Soon more complex relations are expressed by the introduction

of conjunctions and relatives so as to connect clauses into complex sentences, *e.g.*, "I will go and see if papa is there."

The arrangement of words is determined largely by imitation, but is also influenced by shifting of interest and attention. Thus a little girl said, "*Eat*, papa apple," then a moment later when apple (as contrasted with pear) was most prominent in her mind, she said, "*Apple*, papa eat," while at another time, when the person was most thought of, she said, "*Papa*, eat apple."

Records of all sentences used by a child between two and four, during an hour or more, taken at regular intervals, show a marked increase in completeness, length, and complexity of sentences, as is shown by the following extract from such a record and the table on page 252.

Twenty-eighth month. "More pencil" (I want the other pencil); "Little story" (Tell me a little story); "That all?" (Is that all?); "New cuff?" (Is that a new cuff?); "Cracker want" (I want a cracker).

Thirty-fourth month. "Know where is my papa?"; "I want kiss baby"; "No want to be dressed"; "I don't want to be dressed"; "Got some little birds on" (said of a screen).

Fortieth month. "Baby want to get down run round a little while"; "I run back and forth"; "No, I don't want to run out in the hall"; "Baby do like to have me run in here, baby do"; "He want me to run here."

Forty-sixth month. "This is a nice little kitty"; "Don't you want to go down there and pat him?"; "Why don't you, he is nice and soft?"; "He is afraid sometimes"; "I tried to catch him and give him to you to pat him."

Contrary to all rules of grammar, most of the child's first sentences have no subject, many are without an assertive verb, while only a few are without an object. The length of sentence is doubled in a few months, and complex and compound sentences appear and increase in number, showing the rapid growth in mental grasp or span of consciousness.

TABLE OF SENTENCES AND WORDS USED BY "M."

Date	Nov. 11, 1898		May 13, 1899		May 13, 1900	
Age	28 months		34 months		46 months	
	No.	%	No.	%	No.	%
Sentences	100	100	100	100	100	100
Compound Sentences	3	3	5	5	29	29
Complex Sentences	0	0	11	11	14	14
Compound and Complex Sentences	0	0	1	1	6	6
Clauses	101	101	117	117	156	156
Compound Subjects	0	0	0	0	0	0
Compound Predicates	0	0	1	1	3	3
Compound Objects or Modifiers	0	0	1	1	7	7
Prepositional Phrases	2 (8)[1]	2	15[1] (11)	15	29	29
Infinitive Phrases	2	2	17 (2)	17	26	26
Assertive Sentences	42	42	45	45	50	50
Question Sentences	20	20	14	14	28	28
Command or Wish	37	37	37	37	22	22
Incomplete Sentences	96	96	62	62	23	23
Subject Omitted	81	81	38	38	9	9
Assertive Verb Omitted	67	67	44	44	14	14
Object of Verb or Preposition	4	4	5	5	0	0
Words	235	100	405	100	700	100
Nouns	91	38.7	73	18	108	154
Pronouns	12	5.1	113	27.8	186	26.5
Verbs	53	22.5	137	33.6	217	31.0
Adverbs	20	8.5	32	7.8	94	13.4
Adjectives	46	19.5	24	5.9	49	7.0
Prepositions	9	3.8	23	5.6	27	3.8
Conjunctions	0	0	1	0.2	19	2.7
Interjections	4	1.2	0	0	5	0.7
Different Words	107	57.4	130	32.1	180	25.7
Nouns	50	46.7	44	33.8	43	23.9
Pronouns	4	3.7	15	11.5	18	10.0
Verbs	24	22.4	41	33.5	65	36.0
Adverbs	7	6.5	10	7.7	23	13.3
Adjectives	17	15.8	12	9.2	16	9.0
Prepositions	2	1.8	8	6.1	6	3.3
Conjunctions	1	0.9	0	0	7	3.9
Interjections	2	0	0	0	2	1.0

[1] Additional phrases partly expressed.

In changing words to indicate person and number, and in arranging words in the right order, children often make mistakes, but the irregularity of the language in forming plural or tense forms is usually the cause. Without conscious generalization, children are marvelously quick in applying a common form of ending or law of language to new words, *e.g.*, "tooken," "eated," "mans." A similar influence often leads children to make new forms of words according to the peculiarities of the language. Thus M., who had been rolling a hoop, said she had been "hooping," and at another time spoke of her shoe as "worning" out.

Recent detailed studies of the vocabularies and sentences of children from two to five years of age, of the written work of pupils in the grades, and of the understanding vocabularies of older pupils indicate that the number of words *used* may increase at the rate of four hundred or more a year and that the number *understood* more or less perfectly is likely to be three to five times as great. Such figures and those indicating total vocabulary vary greatly according to the forms of words counted as distinct, the size of the dictionary vocabulary taken as a basis for computing percentages, and also as to whether written or oral words are counted and whether the averages are for grades or for individuals. The studies also show that the language of individual children is greatly modified by environment and interests and at the same time is indicative of such influences and of the intellectual development in general and in special lines.

II. Visual Language

The factors leading to the understanding and use of visual language are only partially the same as for oral language. Visual language, as we have it, is at best purely conventional, and hence it is not directly based on or associated with a natural and instinctive form of expression, as is oral language. The imitative tendency is appealed to less frequently and less im-

pressively by visual than by oral symbols Necessity, or the gaining of desirable ends, is a much less important factor in learning to read and write than in learning to talk, because the child already has an adequate and easier means of communication in his oral language than he had in the language of natural signs when learning the oral. It is also much more difficult to make the understanding and use of visual language as necessary to the gratification of the daily desires of the child as in the case of oral language. Questions, answers, commands and remarks might, however, be expressed in visual language a great deal more than they are in the primary schools.

In the early stage of learning to read and write, the only instincts which can be appealed to with as great effectiveness as in oral language are the play instinct and the social desire for approbation. Hence, although much pedagogical skill is now expended in arranging words so as to show their likeness and difference, and lead to their analysis and classification, the progress in learning visual language is, for some time, slower than in the early stage of oral language learning without any formal teaching whatever. Children would probably progress much faster if oral language were associated with visual, in much the same way that oral language is at first supplemented by the instinctive language of natural signs. For example, a teacher may write only the most important words of a sentence and speak the others, or in the earlier attempts at writing, children may be allowed to speak some of the difficult words in every sentence which they write.

After children have gained the power to read with some facility, the instinct of curiosity and the desire to know about the world and its people, and to share the thoughts of mankind as expressed in books, are the important factors in language learning. A sort of reading craze often sets in at this time, which results in an enormous addition to the youth's vocabulary (probably a

thousand words a year would be a low estimate, since, according to the author's investigations, high school graduates usually know the meaning of twenty or thirty thousand words). Reading also exercises a great influence on the language habits. Sometimes even oral language is thus rendered "bookish."

The impulse to express to individuals or to humanity his own ideas and feelings in poem, story, article, or book, often becomes strong in the early teens. If teachers could skillfully use this impulse instead of ignoring or checking it, enormous advances would be made in teaching language as a means of expression.

Interest in language as such, aside from ideas to be expressed, is often first manifested in a marked degree (not counting the early period of imitative play) in a playful form of learning to use and construct secret languages. This tendency reaches its climax at about thirteen. Probably, therefore, this is the age for learning foreign languages. Interest in the study of language as a form of art or as a science, such as is required in literary appreciation and the study of grammar, cannot be greatly developed until the language is learned, and as a rule only after some of the higher forms of æsthetic appreciation and of abstract thought have been reached. Up to this time, children are interested in language only as a means of expressing thought, and the correctness of their language is almost wholly the result of imitation and habit.

After language is learned, rather than before, is the time for studying its structure and appreciating its beauty. Grammar from the pedagogical point of view is not to be regarded as a means of speaking correctly, but as a scientific analysis and classification of means of expression which are already familiar. In this, as in other cases, the natural order for the race and for the individual is to learn how to do a thing, then to admire grace in doing it, or enjoy the scientific study of how it is done.

Methods of learning to read

Methods of teaching reading differ chiefly in the prominence they give to the visual symbols and their associated sounds as compared with the meaning of these symbols, and in kind of previous knowledge which they attempt to utilize. The phonic method emphasizes word calling and strives to build up a knowledge of the sounds corresponding to letters and letter combinations, as a means of facilitating the learning of words and of increasing the ability to pronounce new words. The thought method seeks to arouse appropriate thoughts in connection with the observation of visual words so as to make the child think of the corresponding oral words which are already familiar to him.

It is worth while to compare these two methods of learning visual language with the method by which the child learns oral language, especially when we reflect upon the wonderful command of such language which the child gains in a few years. Even the most superficial observer of children who are learning to talk, knows that they do not learn the elementary sounds of the language, then use that knowledge in learning words. They learn to understand words and phrases as a whole, and later notice their elements and the way in which they are combined into sentences. There is no evidence that anything like the phonic method is used in learning to get thought through the medium of oral symbols. In the matter of expressing thought by means of vocal movements there is also little or no correspondence with the phonic method. There is some preliminary play with the vocal organs which is doubtless helpful in the later learning to utter words, but when a child begins to use words as a means of expressing thought there is nothing to indicate that he is consciously making use of his knowledge of elementary sounds in pronouncing those words.

In learning oral language the child is assisted in getting the

meaning of words by the situation presented, the significance of tone and gesture, and by his knowledge of some of the word symbols used. By these means he gets the thought and learns to distinguish and utter the corresponding oral symbols. He occasionally asks for words to be repeated or practices pronouncing a new word, but for the most part learns the word and its meaning by hearing it used at various times. In the thought method of teaching reading, similar aids are used. Thoughts are aroused in the child's mind, and the visual words expressing them are shown. This makes him think of some of the oral words expressing that thought, and the teacher supplies the others, pointing out the correspondence. A closely related thought expressed by many of the same words is then presented. Knowledge of the things being expressed and of the oral words for expression helps in learning the visual words. After a few words have been learned they assist in arousing the ideas corresponding to each sentence, and the teacher needs less and less to suggest the ideas by other means. If a variety of interesting reading is provided, the child soon becomes able to read readily selections in which the oral forms of the words are already familiar to him.

He can, of course, do little in the way of naming words which are not already known to him orally. It is in doing this that the phonic method is supposed to be especially helpful. It is worthy of note, however, that during the first year or two the words learned are with few exceptions already familiar to him in their oral forms.

In the second or third year of reading, the child is likely to meet many words that are not known to him orally. This is also the time when he usually begins to write and needs to know how to spell words. In learning to read he has incidentally learned something of the correspondence between visual letters and combinations of letters with sounds. A little phonic drill

will increase this knowledge, and, if given in connection with spelling, will be a valuable aid in that subject. Such knowledge will also help in the use of a dictionary. It is, therefore, at this time rather than earlier, and for these purposes rather than in learning to read, that phonic drill is of most value. These remarks apply especially to children who speak well the language they are learning to read. Those who do not, will need more vocal drill, perhaps in the form of phonics. The thought method is also one more easily used with one or a few children than with a large class, and is more successful when applied by an intelligent teacher than by one who is dependent on rules.

The question of the method of first learning to read is of less importance, however, than the question of how long the child's attention shall be directed toward the forms and names of words instead of toward the thoughts expressed by the printed page. A rapid and effective reader sees only the essentials of words and groups of words and does little or nothing in the way of vocalizing the sounds, either actually or by image. To keep the child's attention chiefly upon naming words in his reading lessons rather than upon the thoughts being expressed, during several school years, is likely to produce an expert reader of words with habits which will render it unlikely, if not impossible, that he will ever become a rapid reader in the sense of getting thought from the printed page. Since most people read silently from ten to a hundred times as much as they read aloud, efficiency demands that reading should be taught in such a way as to help children to become efficient in getting thought rather than facile in naming words. The results of reading tests indicate that children taught by the phonic method are much slower and less efficient in silent reading than those taught by the thought method.

Learning to write

Learning to write is analogous to learning to control the vocal organs in the acquisition of speech. The more or less playful marking with a pencil and playing with letters by children from three to six corresponds to the playful exercise of the vocal organs by children of less than a year. This may be followed by more conscious attempts at imitation of letters corresponding to the earlier imitations of sounds, including words. It is only when the child tries to make a certain combination of letters in order to express thought, that his attempt at written language corresponds to his earlier attempts at expressing ideas by vocal movements.

Since a child learns to speak without special drill in the use of the vocal organs, it would seem that he might learn to write without special and separate training of the hand in making the proper movements. Possibly the apparatus for uttering sounds is more easily trained and brought under control than the apparatus of the hand used in writing, but the chief reason why writing is not learned in the same way as is talking is because the need for writing is not felt so keenly and frequently, and the stimulus of others who are expressing themselves in writing is much less effective than in the case of oral language.

If a child lived among people who communicated wholly by writing large words on blackboards and he could understand them and make his own wants known only by watching and imitating them, he would doubtless learn to write as he now learns to talk, without any specific teaching. The learning would perhaps be slower because there are few natural signs to help in interpreting what is being written, while in learning to talk, the natural signs of expression of face, tone of voice, and gesture are of great assistance. Even with these advantages it has been found possible in the case of individual children to

learn to write with little or no special training in the *movements* of writing. However, although children should undoubtedly gain more of their knowledge of writing while trying to say things with a pencil or pen, yet the conditions of school life make it advantageous to give special training in the movements of writing. In this, as in most cases, teachers are usually inclined to dwell too much upon partial and intermediate phases of the complex process, and too little inclined to have it performed as a whole in reaching some desirable end.

It does not take children long to learn the approximate forms of letters, and the stage of drawing letters while looking at models should be shortened rather than prolonged. Very soon the practice should be carried on from memory with occasional comparisons with good models for correction. Separate practice in holding pen and in free movements should be used, but with attention directed rather to the resulting ovals and curves than to the fingers and muscles. These practice movements should alternate with making letters, and later, with writing to express thought, so that the freedom of movement will carry over. Much variation as to size and form of letters should be permitted at first, in order that the child may not be induced to slowly *draw* letters with cramped movements instead of freely writing them.

Any attempt at immediate accuracy and uniformity in writing is directly contrary to the general principles of learning a complex act, in accordance with which there is always a gradual approach to definiteness of movement. As long as the child's writing is varying and in general toward better forms, the progress should be regarded as normal and satisfactory. Watch should be kept, however, to see that some undesirable mode of movement or form of letter is not repeated until it becomes a habit and progress is arrested. When such a tendency appears, it is not usually best to call attention to the defect, but to do something which will lead to a variation, perhaps in excess of

what is desired, then to emphasize the desirable forms and movements as they appear.

Modern methods of teaching penmanship are great improvements over those formerly used, but there is still too little recognition of the fact that it may be advantageous for children to use various kinds of movements in learning to write, before they settle upon the exact movements found to be best for adults who are to become expert penmen. For instance, it is doubtful whether early insistence upon the exclusive use of the muscular movement by young children is wise, taking into account general principles of learning and the probable order in which different muscle groups naturally mature. There is also still too much separate practice upon penmanship and too little practice in using the knowledge and skill acquired, while accomplishing some end by means of writing. This results often in two styles of writing, one used when practicing penmanship and the other in practical work.

Learning to spell

One of the most common illusions of teachers is that children are *learning to spell* only when they are studying a spelling lesson, when, as a matter of fact, they are learning to a greater or less extent how to spell whenever they see or hear or attempt to write words. The chief advantage of spelling lessons is not that the spelling of specific words is learned, but that they compel attention to the elements composing words and cause the child to notice those elements more, when he is seeing and hearing words. Since, however, the natural tendency in language learning is to notice more and more only what is essential to thought, it is necessary to have some special practice in spelling, unless children spend much more time than they do now in expressing themselves in writing.

Phonics are a help in learning to spell, chiefly in that they make one familiar with the usual sounds of letters and com-

binations, so that the child can guess the approximate spelling of a large proportion of words whether they are familiar or not. Phonics should be taught with this end in view.

In learning to spell specific words attention should be directed particularly to the letters which the child cannot guess, from his knowledge of phonics, are the ones to be used. Specific memorizing of parts may be carried on by repeating impressions or images, either of the sound of the letters in the word or their visual appearance, or by both. Again, the process may be carried on by the movements of vocalizing the sounds or by writing the words, or both at once. Some children receive most help by emphasis upon one kind of stimulus or image, and others upon another. The chief thing to be done is to attend, in perceiving or imaging, to the specific elements which need to be memorized, instead of mechanically producing all the elements.

Another point brought out clearly by investigations is that children in the higher grades usually misspell many of the common words which they learned to recognize in the lower grades. This is probably because these words were observed only enough to distinguish them from other words and to get the thought suggested; hence it was natural that the habit of not noticing the exact composition of familiar words was developed. The remedy for this would seem to be earlier attention to the writing of these little common words so as to compel the child not only to recognize the words, but to notice the exact letters composing them. If this has been omitted, the only remedy is special study and practice in writing such words by the children who misspell them.

III. Drawing

Drawing may be considered as an art based on the constructive and æsthetic instincts, but in its earlier stages, at any rate, it

is to a considerable extent really a language based on the expressive instinct.

There is no purely instinctive stage of drawing as there is of oral language, but there is a very well marked playful and imitative stage. Children delight in making marks just as they delight in making sounds, so the scribble stage corresponds exactly to the "da da" stage of oral language. The sight of some one using a pencil is likely to set a child to scribbling, just as the talk of others often sets the young child to babbling. In neither case is there at first any real imitation of distinct movements. A little later, crude attempts at imitating the movements of others are made, but with much less persistency and success than in the case of sounds. Evidently the natural relation of eye perceptions to hand movements is much less perfect than between ear perceptions and vocal movements.

In the next stage, corresponding to the word-learning stage of oral language, drawings are made by the child, not merely for the pleasure of making movements and the joy of imitating, but in order to express ideas of objects and events. Any dot or line or combination of them which suggests to the child the appearance of any object, is at first a perfectly satisfactory picture of it. Often a "picture" is named or renamed after it is made, because something is suggested by the lines or dots. What to the child is most essential, whether visible or not, is indicated, and the rest unnoticed or filled out in the mind. The stomach of a man may be represented when neither the rest of the trunk nor the arms are shown. At first the different parts of a man may be scattered over the paper, a dot or curve being pointed out or made, as each part — eye, mouth, head, etc. — is named.

A little later much more attention is paid to the position of one part in relation to the others, and still later, to the relative size of parts. This evidently corresponds to the word-combin-

ing or sentence-making stage of language expression. The child not only tries to make something which will suggest the idea he wishes to convey, but aims to represent objects; just as in language, his sentences become not merely suggestive of ideas, but complete expressions of them.

At the time when the child's drawings are partly symbolic and partly representative, they are often very free and unconstrained expressions of his ideas. His make-believe tendency helps him to see in his drawings all that he meant by them. He has little feeling of their inadequacy, and is ready to make almost anything, and to tell almost any story with his graphic art, by which both the outside and inside of houses are shown, wind or heat indicated, successive events pictured, and the important parts shown by increased size. During this period the child draws from what is in his mind rather than from what he perceives; hence, his picture of a man or table is generic rather than individual, as is shown by the fact that placing a model before him produces little or no modification of the conventional design he has adopted.

Sooner or later, perhaps most frequently at about nine years of age, the child begins to feel the inadequacy of his representations. This feeling is earlier and stronger because of the criticisms of teachers. He can no longer believe that his drawing really looks like what he wishes to represent; hence, he is not so ready to try to draw everything. This is the time when he needs encouragement, and some instruction as to how he may show perspective and represent objects as they look instead of as they are. The difficulties of doing this are so great, especially when the process is not associated with the desire to express something, that only a few ever regain their former freedom of graphic expression. Drawing becomes for most children, therefore, an exercise in mechanical imitation and representation instead of a favorite means of expression. If drawing were

taught in these early stages as a mode of telling what has been observed, rather than as an art, the results would be far better.

A little earlier than the time at which language acquires a scientific and æsthetic interest, drawing acquires similar interest, and great delight may be taken either in mechanical drawings or in the making of beautiful drawings or pictures. All along there has been some æsthetic interest in colors, but now this interest is deepened and refined, and the appreciation of beauty of form develops. This is the time for artistic and mechanical drawing and for the study of the subject as a science or as a fine art, though drawing as a convenient means of expressing ideas gained in nearly all subjects studied should not be neglected.

Methods of teaching drawing

Drawing instruction has suffered from two sources, belief in logical methods of teaching and the idea that drawing is for the training of artists. The first has led to the analysis of forms into lines and curves and to separate practice in making them, similar to the method used in the alphabet and phonic methods of teaching reading. It has also led to the study of type forms and the drawing of geometrical figures before attempting objects of nature. Experience, however, shows that not only are such drawings less interesting to children, but they really are more difficult. There is only one way of drawing a perfectly straight line or an exact square, and any deviation from the one correct form is more easily seen than corrected. There are scores of ways of drawing a leaf or a whole plant which will give a fairly satisfactory representation of it; hence, results that seem good are obtained and the ability to judge of drawings does not get so far ahead of the ability to make them as to produce discouragement.

Much improvement has taken place in this respect, but the idea that children should make beautiful drawings still domi-

nates to such an extent that a large proportion of children find their work in drawing unsatisfactory. They can see their failures so much earlier than they can correct them that there is little satisfaction in what they do. This is now being remedied in part by relieving children of the necessity of making beautiful forms, which is for most of them impossible, and yet giving them the opportunity to produce what seems to them beautiful by means of color. From the æsthetic point of view, drawing should help children to appreciate beauty rather than train them to produce beauty such as is required by the artist.

With all the improvements which have been made there is still too little attention to drawing as a means of expressing ideas. The motive for drawing a flower or a cup should not be to make a beautiful picture, but to express what is seen. The children should try to make the drawing of a flower such as to indicate what kind it is and which individual specimen was used as a model. In drawing a cup not only should the form be similar to that of the cup, but the drawing should show from what angle the cup was seen by the one who drew it. Only in the technical training of artists should emphasis be placed upon the production of a beautiful picture.

There is still too much attention to immediate details in drawing and not enough emphasis upon the idea to be expressed by the drawing as a whole. To remedy this, there should be much more drawing from memory, the results being corrected and improved by fresh observations and renewed attempts from memory. There should also be more drawing for a purpose, such as to indicate how to make something or to help in the understanding of a description or the appreciation of a story.

In all this work it is not necessary that there shall be a definite, logical sequence in the lessons, but that the children shall undertake something they are interested in doing and that they can do in a manner which is satisfactory at least to them.

Exercises for Students

1. Describe means of expression employed by animals, and show that they are useful.

2. Describe any modes of expression that you have noticed infants use.

3. What kind of words do the blind learn? The deaf? Those who are both blind and deaf?

4. Have you ever had the impulse to express yourself in other ways than by language, such as painting or modeling?

5. Give evidence that there is a tendency to respond to every stimulus by a movement, and for every idea to be expressed in movement. Illustrate how words may be used in place of other movements. Look up the root meanings of several words.

6. Is the growing custom of beginning to teach deaf children at an early age a good one? Why? If a deaf and a hearing child enter school at five, which should be farther along in language, the deaf child at twelve or the hearing child at nine? Why?

7. Can you express feeling by writing as perfectly as by talking? Why? Are children under ten affected as much by stories told as by stories they read? Why?

8. Report any instances you have observed of playful or imitative use of words by young children.

9. Report any observations you have made of the serious efforts of children to learn words.

10. Illustrate how necessity leads a child to learn to understand and use language.

11. State facts showing the prominence of one or another of the stages of language learning of a child you know.

12. Report just as many examples of childish mispronunciation as possible, and state the cause if you can. Compare tables of Lukens and Tracy.

13. Record and report vocabularies of children of about two years if possible, noting pronunciation and meaning and parts of speech of all words. Compare with Tracy, Moore, Gale, *et al.*

14. Record everything said by a child of two or three during an hour or two, and study to discover omissions and other peculiarities.

15. Report instances of children extending the rules for forming endings or in making new forms of words.

16. Report what you have done or observed regarding secret languages. Could not the playful tendency to make a language be utilized in the study of visual language more than it is?

17. Illustrate how the same kind of necessity which leads a child to learn oral language may be used in learning visual language. Illustrate in detail how oral language may be used to supplement visual, *e.g.*, the teacher says part of a sentence and writes the rest.

18. Estimate your own vocabulary by counting all the words you know on every tenth, fiftieth, or hundredth page of the dictionary.

19. Let some one pose for children of the kindergarten or first grade while they draw. Examine the drawings. Bring in specimens of drawings of children not yet in school. Compare Barnes, Sully, Lukens, and Brown.

20. Have children of several grades illustrate a story, and make a study of the drawings.

21. Should drawing be taught children as an art or as a means of expression before ten years of age? Why?

Suggestions for Reading

On the general subject of expression and language, consult Romanes, *Mental Evolution in Man*, chaps. v to ix; Baldwin, Vol. I, pp. 221–262, and Vol. II, pp. 126–139; Whitney, *Life and Growth of Language;* Robinson, *Pop. Sci. Mo.*, Vol. LVI, pp. 784–798; Hale, *Pop. Sci. Mo.*, Vol. XXX, pp. 712–713; *Science*, Vol. XII, O. S., p. 145.

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CHAPTER XVI

DEVELOPMENT OF INTELLECT

GENERAL ORDER OF DEVELOPMENT

As we have already seen, the child begins life with little or no conscious intelligence, yet with well-marked reflex and instinctive tendencies to act for its own good. This unconscious mechanical intelligence controls the infant's action and enables it to survive. It also determines the general characteristics of conscious intelligence, for it determines the kind and sequence of movements and, to some extent, of sensations other than motor, as the child acts and reacts in ways favoring self-preservation.

Intelligence develops by utilizing past experiences in reacting to new situations. Reflex and instinctive tendencies produce reactions which give the original basis of knowledge. As various instincts ripen, the tendencies to react so as to get experiences appropriate to their satisfaction increase, and thus the materials with which intellect deals, naturally vary with age. What the child shall be interested in and the general lines along which intellectual development shall proceed, are thus determined to a greater or less extent at each age by the instinctive tendencies most prominent at that time.

On the other hand, the natural and social environment of the child furnishes the outer stimuli to mental activity and determines the situations which must be met by the intellectual responses of the individual. These environmental influences often have even more effect in determining interests and the

general lines of intellectual development than do native talents. They cannot, however, wholly modify fundamental instinctive tendencies. For example, the same kind of interest in love stories cannot be aroused in a child of six as in one of sixteen.

The chief problem of mental development from the intellectual side concerns the method of utilizing past experiences in reacting to varying situations. The intellect is instinctively applied to the task of obtaining the most satisfactory result as easily and quickly as possible. A child may show as high a grade of intelligence in doing this as does an adult, but the adult has a different way of using past experiences in meeting the new situation; and this in part constitutes the greater maturity of the adult intellect. This maturing of intelligence is largely the result of extensive experiences, but not wholly; for some intellects, as in the case of the feeble-minded, never mature, and extensive experience of a certain kind cannot produce exactly the same kind of maturity in a child which is found in an adult, although it may almost do so in one or two narrow lines. Maturing of general intelligence, like growth, proceeds much more rapidly in the early years of development.

The most elementary form of intellectual activity which aids in meeting varying situations is *perceptual*. It requires sensory discrimination which makes it possible to vary the reaction in fitting ways according to slight variations in the situation and the exact nature of the stimuli. By such sensory discriminations, an individual is able to select more and more accurately suitable food, avoid injuries, and react in the right way to companions. The greater the intelligence, the more readily are modifications of reactions made, and the more quickly is the most favorable one found. When such favorable reactions have been found, habits are soon established. After that, conscious intelligence has little more to do with such special acts as long as the conditions remain essentially the same. In-

telligence thus helps in modifying and combining natural reactions into useful habits of the individual. So far as the particular reaction is concerned, conscious intelligence and will are used chiefly during the period when the native reactions are being modified into particular habits, after which they play little part in meeting similar situations.

It is found that when an animal or child is presented with a new situation involving different stimuli and calling for a different reaction, the way in which this situation is met depends upon previous habits. Sometimes a previous habit delays the finding of the best response to the new situation, and sometimes it hastens it. Several related habits, not too firmly established, are nearly always helpful in learning the right response to new situations. The grade of intelligence of any creature corresponds to the readiness with which past experiences in learning are utilized in learning something new. Increased ability in discriminating what in the present situation is essentially like former situations is a mark of maturing intelligence. It involves increased analysis of situations and classification of elements which are similar. In this an older animal as well as an older human being usually shows greater maturity than a younger, even when they have had the same amount of experience of the particular kind related to the thing being learned, *e.g.*, a series of mazes, problems, or puzzles. All that precedes applies to both animals and children confronted by a situation involving immediate sensory stimuli, which may be met by the use of things which are present. In the exercise of such perceptual intelligence some animals and feeble-minded persons rival normal human beings.

There is another form of intellectual activity, *representative* in character, which is engaged in by normal children at a few years of age, which is almost if not quite impossible to animals. This is used in reacting in advance to situations not sensorially

present. A little girl plans what she will have at the play tea party when her little friend comes. In such cases the situation is represented and also the suitable reaction to be made, and no immediate sensory discrimination is involved. The imaging process required is quite a different form of intelligent action from the sense perceptual process previously described. It is, however, founded on sense experience and represents a higher development of intelligence. There is, of course, a great deal of mental activity of an intermediate stage in which some of the elements of the situation or the reaction are sensorially present or where something that is present is used to represent what is not, as is so often the case in children's dramatic plays. The ability to plan for a distant future which is characteristic of human beings as compared with animals, and of adults as compared with young children, is dependent largely upon the development of a kind of intelligence that can act successfully by means of representative processes.

There is a still higher form of intellectual process which is used by more developed and mature minds which may be designated as *conceptual intelligence.* In the exercise of this form of intelligence, the sensations given by material objects have little part, and even the images of things are not necessary. The situation to be met does not involve discrimination of sensations or clear representation of a particular past experience, but it does involve in a high degree the utilizing of many past experiences. In most instances, symbols are observed or imaged and used to represent not any one individual experience, but the classified and generalized results of many similar experiences. For example, in answering this question, "What would you do if you were in the woods and saw some wolves coming toward you?" one does not need to observe or image a wolf or a tree (although he may do so) in order to mentally meet the situation. The symbol "wolves" takes the place of a group of dangerous

animals which cannot climb, while "woods" is the symbol of a group of objects which may be climbed by human beings.

The more mature and highly developed the intellect, the more will it be possible to thus mentally meet situations which are not present, without detailed representation of them. The important elements of past experiences have been selected and classified in such a way that they, as well as the proper mode of reaction, may be represented by symbols. This form of reaction is impossible to young children and to the feeble-minded as well as to animals. A young child or a feeble-minded individual might find how many blocks an inch square would be required to make one row around the inside of a box three by four inches, by placing them in position, then counting them. An intelligent child of ten might be able to solve the problem in the absence of both box and blocks by imaging them or by making the marks on paper to represent them. An older person could learn to solve all such problems by means of symbols, using such a formula as, "The number of blocks equals the perimeter of the box, less four." The first method is slow and adapted to undeveloped intellects, the second is more rapid and requires human intelligence of considerable capacity, while the last requires a highly developed intelligence able to use symbols in the place of actual or represented past experiences of certain kinds, and can be used with much greater rapidity and certainty when the numbers involved are large, than can the other methods.

We find, then, that development or maturity of intelligence is marked by changes in interests growing out of changes in instincts and by a greater and greater independence of immediate and particular sensory experiences. The development of a higher and more efficient type of intelligence in a particular line may be hastened by setting before the individual numerous situations or problems and stimulating him to solve them, and

by directing attention to the essential elements of the situations and of the successful reactions to them. If, however, a child is taught formulas to be memorized and used mechanically without having sufficient sensory and representative experiences of what the symbols represent, he will not have gained anything that will help him in generalizing from other experiences and thus exercising a higher form of intelligence.

DEVELOPMENT OF DISCRIMINATION

Discrimination in early life is one of the most essential of all mental powers, and it seems to be greater in adults than in children. It may be doubted, however, whether the better discrimination of adults is not a matter of special knowledge and practice, helped a little by increased power of analysis and concentration. An Indian can read the signs of the passage of enemies or wild animals much more perfectly than the white man, who is so acute as to read little black marks on paper; a sailor can see land long before the landsman, and a blind man can recognize persons by touch or sound with a readiness astonishing to a seeing man. In all these cases one seems to have greater power of discrimination than the other; but in every case it is probably wholly the result of special knowledge and practice. Each knows what signs to look for and what they mean, while the man of different training is familiar with an entirely different set of signs. Each has certain centers developed, but we cannot say that one has greater *general* power of discrimination than the other. The effect of knowledge upon discrimination is impressed upon one when he tries to read familiar sentences and unknown names in a dim light, or in poor writing, for one may easily be read while the other cannot be made out at all.

The extensive experiments of Gilbert upon children of school age indicated that their power of discrimination of weight, distance, color, pitch, etc., increased from two to five times with

age — a difference corresponding pretty well to that which may be produced in certain lines in a short time by special training. Since most of his tests were made in such a way that comparison and classification of a number of stimuli, as ten colors, were required, instead of mere discrimination between two, it is probable that the superiority of the older children was due partly to increased power of concentration, systematic comparison and expression, and partly to greater practice in making discriminations similar to those tested, and not at all to any fundamental difference in the power of discrimination of children of different ages.

DEVELOPMENT IN RATE OF MENTAL ACTIVITY

The difference in the mental quickness or reaction time of children and adults is very marked, but it may be doubted if it would exist were both to face an experience equally new to both. It is a well-known fact that any act, physical or mental, can be performed more quickly after practice. The reasons for this are: (1) nervous impulses move more rapidly so that movement and thought are quicker; (2) they go more directly and continuously so that motion and thought are less diffuse; and (3) several series of impulses move at once, as when one is reading notes, playing with both hands, and singing at the same time.

It is not unusual for simple reaction time to be reduced one half by practice; and complex tasks are frequently done, after a few months' practice, in from a half to a fifth of the time required for the first performance. Hence, it is not improbable that the difference in mental quickness of children and adults is entirely the result of incidental practice in activities which are the same, or partly the same, as those tested. The tests of Bryan, Hancock, and Gilbert, on rates of movement, and of Gilbert, Bentley, Partridge, and Curtis on reaction time, both simple and complex, show that from school age to maturity the

rate of movement and of mental activity is not quite doubled, and that the improvement is greatest where there has been most special training, as in naming printed words, rather than naming pictures or objects; hence, there is little reason to doubt that the difference between adults and children in rate of mental activity is almost wholly the result of training, either special or incidental.

INCREASE IN MENTAL GRASP

That the child's mental grasp is small, is evident from his first attempts at speech. He cannot keep several syllables in mind long enough to pronounce them all. His ideas are expressed by means of single words or gestures. Soon he uses two words, usually a predicate and object or modifier. His sentences grow longer as adjectives and other modifying words are added, but it is a long time before conjunctions are used and compound sentences formed. Complex sentences, which require even more mental grasp, come still later. A little girl of thirty-two months understood, when told to eat her potatoes with her spoon and her meat with her fork, but was unable to hold the four ideas in mind while she got the right words in which to express them. A few days later, however, she used her first conjunction in the sentence, "I pin it there *so* baby can get it." Children are often confused when told to do more than one thing, because they have not sufficient grasp of consciousness to hold all in the mind at once. The fact found in many tests, that children of school age read by words and cannot carry in their minds any but short sentences, while older children and adults read by phrases or even clauses, and can carry in consciousness enough of a long, complex, and compound sentence to give each clause the right expression, is very significant.

The experiments of Jacobs, Jastrow, Bolton, Smedley, and the author, upon children of school age, show that their ability to repeat or write a list of letters, figures, syllables, or familiar

words, immediately after they have been heard or seen, generally increases with age by about one third, from the age of eight or nine to eighteen. As the reproduction is immediate, it is not so much a matter of memory proper as of mental grasp.

The cause of this increase in mental grasp with age is probably the same as that which makes it possible for us to hold in mind a long description of a route to be taken among familiar objects; while a short description of a route among unfamiliar objects cannot be kept in mind long enough perhaps to get started right. The same cause makes it easy for a skillful chess or checker player to see at once many more results of a move than he could when he began, or for an experienced musician to play with both hands, work the pedals, perceive the notes, and sing the words of a song all at the same time. In other words, ideas, or a series of ideas, and even combinations of several series of ideas that have become definite and well established, are easily held in mind, while indefinite and newly formed ideas can be kept in consciousness only in limited numbers and with effort.

The ideas of the child are largely new, while those of the adult are oftener old or connected with old ideas; hence the adult's mental grasp is greater chiefly because of knowledge and experience. The effect of knowledge on mental grasp is well shown by a series of experiments in which first-grade children and adults reproduce ordinary letters, Greek letters, and familiar sentences. The adults have little advantage in the case of Greek letters, a great deal in ordinary letters, and are almost infinitely better in reproducing the letters making a sentence. Evidently the difference is due to greater familiarity and increased mental grasp.

DEVELOPMENT OF PERCEPTION

Perception depends upon three things: (1) the sensations experienced at the moment; (2) power of discrimination, and

(3) the results of past experiences which are reproduced more or less perfectly at the moment of perceiving. The power of discrimination varies, as we have seen, with special practice. The chief difference, therefore, between the perceptions of a child and of an adult, is in the past experiences which are called up by the sensations.

Since the adult has many more experiences that may be suggested by a sensation than a child, there is a greater possibility of a wrong idea being awakened; but this is offset by greater power of discrimination; hence, though the adult is not always more quick in classifying an object or interpreting a sensation, he is likely to be more definite and accurate than the child who has fewer possibilities suggested from his limited experience, but who does not so readily analyze and note essentials. The difference is not, however, greater than that between adults of different occupations, such as a botanist and a milliner, a printer and a pilot.

The practical necessity in all perception is not to note the exact nature of the sensations produced by different objects and under different circumstances, but to recognize objects and react to them in the proper way. Nothing but a sphere gives, in all positions, the same visual sensations; hence, we learn to know, not the apparent form of objects, but their real form. This "real" form, however, is simply the appearance which they assume when perceived most clearly, *i.e.*, when near at hand, directly in front, and at right angles to the line of sight. Other sensations vary also. For example, the sound produced by an object depends upon what it is struck with, as well as its distance; while objects vary in taste according as they are more or less hot or cold, wet or dry, etc.

Before the child enters school, he has learned to know just what appearances may be relied upon as indicating a certain form, sound, taste, or touch. He has also learned an immense

number of correspondences between the different senses, so that he no longer needs to feel of most things he sees, in order to know, as much as he wishes, of how they will feel, or to strike or taste them, to know how they will sound or taste. Yet there are many appearances and correspondences which he does not know very well, and hence, as compared with adults, he is still at considerable disadvantage in judging objects. He also fails to note fine distinctions unless necessity requires it, for very different sensations have nearly the same practical meaning to him.

The necessity of identifying an object by means of sensations suggesting its "true appearance," rather than by the exact sensations it gives, together with the limited power of discrimination which children have, renders them very *suggestible*, or, in other words, undiscriminating as to whether a sensation is actually experienced or only called up by other sensations. Small found, that of children in the first grade about nine out of ten could be made to think that they experienced sensations of taste, smell, temperature, and visual movements, when no such sensations were given them; while the proportion that could thus be deceived, became very much smaller in the higher grades. The author's tests with ink spots also showed that critical judgment becomes more prominent than suggestibility in the fourth, fifth, and sixth grades.

On the other hand, the habit of the adult mind of looking only for essential characteristics may lead him into error when the conditions or his purposes change. For example, it is very hard for one who has been reading rapidly for the purpose of getting thought, to read a printed page for the purpose of correcting the proof. If the thought and language are very familiar, as when the proof is of an article by one's self, the errors overlooked are likely to be very numerous. Pillsbury's tests show that familiar words misspelled are frequently read without the

error being noticed, and that letters spelling nothing are often seen as words. Children, therefore, sometimes notice mistakes in spelling and changes in the arrangement of things which are overlooked by adults, because the tendency to perceive certain words and arrangements is not so strongly developed in them.

Since the purpose of perception is to identify objects and make the proper reaction to them, and since the characteristics to be noted differ according to the end in view, quickness and accuracy in perception depend on discrimination *in relation to the end* to be gained. Definiteness and accuracy of perception can, therefore, only be developed by practice in perceiving *for a purpose*. Careful discrimination of sensations, analysis, and the discovery of essential characteristics, and the learning of what characteristics go together, so that when one is experienced, others may be inferred, are the natural results of efforts to obtain practical ends. For example, in learning to tell when watermelons are ripe, the color, hardness, sound, and appearance of the melon and of the curl are discriminated, and their connection with the inside appearance and taste of the melon is noted. Or, again, in trying to build a house with blocks so that it will stand and look pretty, careful discrimination of form, position, size, and color of the blocks, and of their relation to each other, is necessary. Similar statements are true of nearly all games, plays, and construction in which children engage, as well as in drawing, writing, and all affairs of practical life.

The function of the teacher in such training is principally to put before the child interesting and definite things to be done or found out, and to occasionally direct his attention toward essential characteristics so that habits of analytic and concentrated attention will be developed. This gives a training in perception not to be gained by any series of exercises for the special purpose of training the senses only.

Since such training of perception is, in the nature of the case,

special as regards the purposes directing it, general training in perception can be secured only by getting children interested not only in many things, but in many things from various points of view, as the practical, scientific, æsthetic.

DEVELOPMENT OF THE POWER TO IMAGE

True images are formed only when an object not present is represented, as when a child recognizes that some person or object is not in the usual place. Language is probably an important factor in developing such images: the sound of the word "dog," being closely associated with the animal, calls up a visual image of him just as his barking does. Words are for some time almost as closely associated with objects as are the sensations concerned in their perception. The name of an object is really, to the child, a part of his perception of the object; hence, it is not strange that a little boy put a curl at the end of the word "dog" he had written, to represent the tail, or that a little girl of three and a half readily learned the script word "cow," because the finishing stroke of the last letter looked to her like a horn or "hook," as she called it.

After a child has gained the power to form mental images, he takes much the same pleasure in forming them that he showed a little earlier in getting sensations of all kinds. His first interest in stories is largely the pleasure of forming mental pictures of all the familiar objects and acts named. It is some time before the connection of the parts of the story is of much significance to him.

By the time the child is three or four years old, the parts of short stories are connected so as to give a pretty good understanding of the story as a whole. This means that the mental grasp and power of constructive imagination is developed so that he can combine mentally several acts and images according to verbal direction.

Soon the child recognizes his power in this direction, and begins to combine mental images according to his own ideas. He now experiences something of the same pleasure that he felt when he got beyond the stage in which sensations were changed for him by the action of other people, into the stage in which he effected the changes for himself by his own movements. His daily sensory activities have lost the charm of novelty, the stories told him have directed his imagining in a way that is new and pleasurable, yet this pleasure is dependent upon the will of others; hence, it is an important epoch in the child's development when he learns that he can use the power of free creative imagination, and experience whatever combinations of mental images he wishes, independent of his surroundings and of the action of other people. It is not strange, therefore, that some children for several years live a large part of the time in this free imaginary world, which they people with toys, animals, and imaginary companions which conform to the will of their creator.

This imaginary world may seem as real and more important to the child than the world of solid reality; hence to tell what takes place in it is more pleasurable than to describe uninteresting realities. He tells imaginary experiences as naturally as an adult tells a dream, and no moral significance should be attached to the child's stories until he distinguishes between the experiences of the two worlds and learns to appreciate the desirability of making such distinction clear in all that he tells.

The child's images are often more *vivid* (at least as compared with the original perceptions) than in later life. Some children have difficulty in distinguishing images from percepts, so that their images are in reality hallucinations. It is probable that after definite standards of "true appearances" have been established, images usually become less vivid with increased age, except at about fourteen or fifteen, when images are for a time probably more vivid.

One reason for decreased vividness of images is that one finds it necessary to note class rather than individual characteristics as he meets with many varieties. For example, lilies or turnips are easily pictured, so long as only white ones are known, and officers are easily imaged so long as only a few large, blue-coated policemen have been seen; but when many varieties have been met with, mental images are a less satisfactory means of thinking of each class of objects. The increase in vividness of images at fourteen or fifteen is probably correlated with physiological and emotional changes. After puberty, images become more or less vivid, according to the nature of one's mental operations. A student of an abstract subject is likely to image less, and an artist or anatomist, more vividly and definitely.

The studies of Phillips and others show that many peculiar number, form, and color associations originate in the early years, usually before entering school.

As regards *accuracy* of images, the results depend upon interest and practice. Wolfe found that younger children represented the size of pieces of silver money, of bills, areas of circles, and length of lines in inches, more accurately than either the fourth grade or the university students. The author's own studies, also, indicated that there is little difference with age as regards judgments of the size of a quart measure, distance apart of carriage wheels, number of wings and legs of a fly, etc. On the other hand, the power to image words, as shown by ability to spell, grows with age during school life.

As to *kind* of images most used, observation does not confirm the *a priori* view that taste and smell are more prominent in the mental life of the child than of the adult, for young children discriminate poorly with those senses, and are readily drawn from them by stimulating the eye or the ear. It is not likely, therefore, that they play much part in the child's mental imagery, especially as his chief food, milk, has little taste or odor. In

general, for young persons making much use of visual language, pictures, maps, and diagrams, the changes in kind of imagery are from the motor and auditory to the visual. According to Smedley, the climax of ability to reproduce auditory numbers is reached between thirteen and fourteen, and for visual numbers, between seventeen and eighteen. The experience which the child has in the schoolroom of learning a visual language, learning visual signs for numbers, of studying things by means of pictures and diagrams, and of being required to perform mathematical and other operations by means of visual images, develops the tendency to represent everything visually. In the lower grades the child's words and numbers are auditory and motor; but as he reaches maturity, visual words and figures become more prominent, until finally adults can often understand visual language much better than auditory.

GROWTH OF CONSTRUCTIVE IMAGINATION

Constructive imagination depends for its development upon (1) the acquisition of mental images, (2) attention, or power of control of images, and (3) mental grasp.

(1) As bricks could not be made without straw, so constructive imagination cannot act without mental images.

(2) *Power of attention*, or control of mental images, is no less necessary. Constructive imagination differs from reproductive imagination or memory, inasmuch as images are not combined as they were in the original experience; and from creative imagination, in that the mode of combining images is not determined by the choice or the habits of the one imaging, but by the directions of another. Considerable power of attention or voluntary control, therefore, is necessary. In listening to or reading a description of a house, for example, one must not give it color, size, position, material, etc., according to his more

usual experience or his own taste, but picture each according to the description as he hears or reads the words.

The disposition of mental images is difficult to the child, for much the same reasons as is accurate control of movements. Yet if the words are familiar, the subject interesting, the arrangement of the ideas in accordance with the child's habits of thinking, and the rate neither too fast nor too slow, the words direct his attention so that little effort on his part is necessary. This experience in thus having his attention directed, prepares him to direct his attention according to the words, when not so interesting or so well arranged.

(3) Yet, however well the child's attention may be directed, his *mental grasp* is limited; hence, complicated descriptions, which require that a number of things shall be kept in the mind at once, in order that they may be properly related, are beyond a child's powers. For these reasons, the ability of children to draw or do things according to direction is limited. The kindergarten child may be able to place the base of a triangle on the top side of a square; but if there are several figures and positions, he is unable to hold all the images in mind so as to construct the figure. For the same reason primary children are unable to make complicated things, comprehend long sentences, appreciate stories having many characters and incidents, or perform problems involving several numbers or conditions.

Since mental grasp in any line increases as ideas in that particular line become more familiar, the power of constructive imagination may increase much more in some lines than in others. A child, therefore, who can readily represent, visually, certain combinations of figures, lines, or letters, may fail in the less familiar ones, or find it hard to represent the result of combining two or more sounds, and hence be slow in word building.

The constructive imagination is called into play by stories, reading, arithmetic, geography, and history, providing they are

taught as they should be, and by directions such as are given in physical exercises. The proper understanding of lessons, and the development of accurate constructive imagination, cannot be brought about by allowing the pupil to perceive every object and combination every time, but by having them partly imaged and partly shown, then imaged by the help of simple pictures, diagrams, or gestures, and finally by means of words only.

DEVELOPMENT OF CREATIVE IMAGINATION

The essentials of creative imagination, aside from abundance of images from past experiences, are free activity and the impulse to create stirred by interest.

(1) *Free activity* means either spontaneous activity or activity whose excitant is so subtle that it is not discernible. To put it in physiological terms, nervous impulses tend to diffuse themselves to parts that have not been active, or to pass irregularly from one established center of activity to another. If there is a strong tendency to such activity, many unusual combinations of mental images will result, a large portion of which may be merely absurd or grotesque (as they usually are in dreams), but some of which are likely to be artistic or useful.

Careful training, which results in definite ideas and particular ways of doing things, if continued for a long time, checks the tendency to free activity and may destroy the power of creative imagination. It is for this reason that untrained men like Edison are often the most original. Definite training, with some imitation of various models, gives a good basis for the development of the creative imagination; but the training and the imitation must be varied and not too long continued in one line, or the material becomes "set" by habit, and can be arranged only in the customary ways. An artist, for example, who studies and imitates one school of painting only, for years, can never become an original painter.

(2) The *impulse* to *create* cannot be directly produced by training, since it comes from instinctive tendencies to construct and express, stirred by various emotions. It is especially strong when new experiences are met or new instincts come into prominence. One of the first emotions to stir the imagination is often that of fear, especially when the child is alone in the dark. Later the more æsthetic emotions stimulate the imagination. The earliest creations are likely to be expressed in actions, especially in representative or dramatic plays, and in constructions, at first with blocks, then in making toys, forts, and machines. After several years of school life, oral language, music, and drawing, and a little later, written language, are the principal media of expression.

The subjects with which creative imagination deals are various, but are evidently determined by the emotional and instinctive interests prominent at different ages. Moreover, new experiences or ideas of one age become entirely familiar a little later, and hence do not excite the imagination unless they are brought into new relations. It is, therefore, impossible to say just what exercises are best to develop the creative imagination of a child or group of children, unless one knows the children; but we may say, in general, that whatever stirs the emotions and excites a desire to do something stimulates imagination, and that previous experiences in perceiving good models, and in imitating, expressing, and constructing, furnish the conditions for its effective use. For example, to tell a child to write an autobiography of an oak tree when he knows little about how the oak tree grows, and less about what an autobiography is, would be absurd; but if he had recently heard several biographies, and had been studying about acorns and oaks, it is not improbable that he would have both the impulse and the necessary training that would lead him to write an imaginative autobiography. His previous experience in writing, as a mechanical act and as a means of expressing his

own ideas, and his interest in autobiographies and in the growth of oaks, together with the special motive for expression, as, for example, the desire to write a story that will please mamma when it is taken home, will, with other things too numerous and subtle to enumerate, influence the activity of creating and expressing.

Notwithstanding the fact that creative imagination is more dependent upon individuality, mood, and special circumstances than any other mental activity that may be classed as intellectual, yet there is nothing in mental life more certainly characteristic for different ages than the nature of the fancies as new instincts develop and emotional interests change. The boy's day dreams of a dog and a cart have no attraction for the youth who pictures himself rescuing a beautiful maiden, or for the business man, politician, or artist who dreams of his plans and successes. Learoyd and Calkins, who secured by inquiry an account of continued stories carried on in the minds of one hundred and seventy-five persons, found that in the younger years such stories were usually concerned with fairies and martyrdoms, in late childhood and youth with romance and adventure, and in maturer years with practical affairs.

DEVELOPMENT OF MEMORY

As already shown, mental grasp or memory span, in reproducing impressions just received, increases with age in a marked degree. The increase in power to recall after an interval of time, which is more properly called memory, is much less. Jastrow found that university students remembered only 1 or 2 per cent more words after an interval of three days than high school students five years younger. The author's tests showed little difference in the reproduction, after three days, of words seen or heard and objects shown, by children from the third grade up to college students, except that the memory of the older persons was more voluntary and less ready and spontaneous.

Shaw found that a story consisting of three hundred and twenty-four words, and nearly half as many distinct facts, was reproduced more than twice as fully by pupils of the ninth grade as in the lowest grade tested, and as well or better than by high school or university students. He counted as correct, facts expressed in other words than those given in the story. The greater difference with age in this test, compared with others, is probably because it involved associations of ideas instead of mere retention of impressions. If we take into account the slight mental grasp of the children and the length of time required for them to express what they remembered in writing, the difference in memory of impressions is almost nothing, while in memory involving associations of ideas it is somewhat greater.

The plasticity of the child's brain is probably greater than that of the adult and the retentiveness nearly as great. The difference in the memory of children and adults is, therefore, a difference in kind rather than in degree, and is caused largely by experience. Meuman claims that retentiveness is greatest at the dawn of adolescence, but his results may be explained by the fact that there is better concentration on impressions at this age than earlier, and less abstraction from particulars than later. Nothing that can be used as a memory test is as new for the adult as it is for the child. The adult already knows a part of what he is given to remember, or, in other words, certain brain centers have already had practice in reproducing such impressions. In the adult brain also, where many centers are already well practiced, new impressions readily run into the old channels; hence impressions are easily classified, and their centers readily awakened to activity again because of their connection with centers frequently called into action. Finally, the adult mind has more power of voluntary attention, both in receiving impressions and in trying to reproduce them by holding in mind some idea connected with them. As a consequence, the spontaneous and un-

classified memories of adults are not better than those of children, if they are as good, while their voluntary and systematic memories are usually better.

The above differences are most marked between children and well-educated adults, while adults without systematic training differ but little from children in this respect. The trained mind has much greater power of attention, and a much more definite system of classified ideas, or, in physiological terms, more distinct centers of activity and paths of association. Development of memory, is, therefore, largely a matter of training in habits of attention and in methods of classifying impressions. Most improvement in memory is special, certain classes of things only being attended to, classified, and remembered, while others are unnoticed, and consequently not remembered. If accounts of discoveries or improvements in his special line are read, respectively, by a historian, a botanist, a chemist, a psychologist, a bicyclist, a civil engineer, or a doctor, each readily attends to, classifies, and remembers the facts of his specialty; but all would experience great difficulty if they exchanged memory materials. So special is the development of power in these directions, that one man may remember figures indicating dates readily, but utterly fail to remember a list of prices readily recalled and quoted to him by a business man. One mathematician who could repeat in order as high as fifty-two figures, could not repeat more than eight or nine letters given orally as were the figures.

Memory for isolated impressions, and in fact for nearly all things that are largely sensory, reaches its climax early in the teens. The plasticity of the brain probably decreases after puberty, and further improvement in memory is special, conceptional, associative, and only along lines in which one has already started; while the tendency, and in part the ability, to acquire and retain facts in other lines, after a while decreases,

until in old age the number of facts acquired each year is very much less than the number forgotten.

DEVELOPMENT OF CONCEPTS

The child is largely engaged in sense perception, and thus his thought processes are not far removed or easily distinguished from his sense activities. The sight of its mother may produce in a child of six months some expectation of auditory, tactile, and other sensations which have been previously experienced in connection with seeing her. There is, however, probably no distinction or separate representation of each of these sensations; yet other persons, as well as the mother, are distinguished from chairs, beds, and other inanimate objects, and call up a different class of images. There must therefore be the beginning of the concept of a class of objects which we know as persons, with common characteristics differing from those of inanimate things.

This crude form of concept, much like that gained by animals, may be formed without language. This must have been the case when a child, less than a year old, who was shown a bird, turned and looked at a stuffed bird in the room, and when another child, a little over a year old, showed surprise and fear at an envelope which seemed to move of itself, which was contrary to her idea of that class of objects. A child can sort blocks, putting those of a color together, before he can point to, or give them as they are named. In the case of M. this was true for a year. He also forms class ideas before he uses class names. For example, men are distinguished from other objects, and from women and children, by the particular name "papa," but they are not all treated as that particular individual is; hence papa is not only perceived as an individual, but there is a crude concept of the class to which he belongs. There can be no doubt, however, that language is an aid in the development of

thought, and a necessary factor in all general and abstract thinking. There is nothing in general and abstract concepts such as "organism" or "color," by which they can be recalled or indicated, except a sign or symbol of some kind which can be associated with the common element in the variety of experiences giving rise to the concepts. A word is a convenient mode of reacting to all members of a class of objects, and therefore an important part of the concept, as well as a means of recalling and expressing it.

The first few hundred words and concepts are gotten by children through direct association with objects and experiences. These first words help in gaining other concepts and words as the child hears them in remarks and stories, and in answers to his questions. Often for several years the child's questions show that he is learning the general qualities of things of which he is trying to form concepts, *e.g.*, "Is iron heavier than wood?" "Will iron burn?" "Is there anything stronger than iron?" "Where do we get iron?" or again, "What do policemen do?" "Where do they live?" "How strong is a policeman?" "Is he stronger than you?" "Do they always have a club?" In school, formal definitions, special study, and reading become important means of acquiring concepts and making them more definite.

Three degrees of definiteness of concepts may be named: (1) One in which a class of objects can usually be distinguished from other classes in ordinary experience, but whose distinguishing qualities have not been picked out or named, as when a child can tell dogs and cats apart, but cannot state the difference. (2) A stage in which one or more of the most evident characteristics which distinguish one class of objects from other classes, as, dogs "bark" and cats "mew," may be stated. (3) Perfect concepts in which all the distinguishing characteristics can be named, or, in other words, when a scientific definition can be given, as, "A parallelogram is a plane figure whose opposite

sides are parallel and equal." A young child's concepts are all of the first degree, yet the most cultivated man probably has some of the first type, and a good many of the second; while few of his concepts outside of the lines to which he has given special study are of the third degree.

The difficult task of finding what concepts of common things, of the second degree of definiteness, are possessed by children upon entering school, has been attempted in Berlin, Boston, and other places. As a result of such study, Dr. Hall concludes: (1) "There is next to nothing of pedagogic value, the knowledge of which is safe to assume, at the outset of school life. (2) The best preparation parents can give their children for good school training is to make them acquainted with natural objects, especially with sights and sounds of the country. (3) Every teacher, on starting with a new class, or in a new locality, to make sure that his efforts along some lines are not utterly lost, should undertake to explore carefully, section by section, children's minds with all the tact and ingenuity he can command and acquire, to determine exactly what is already known. (4) The concepts that are most common in the children of a given locality are the earliest to be acquired, while the rarer ones are later." Some of the striking per cents of ignorance of the Boston children are as follows: —

Robin	60.5	Ankles	65.5
Pig	47.5	Elbows	25.0
Chicken	33.5	Dew	78.0
Elm tree	91.5	Woods	53.5
Wrist	70.5	Hill	28.0

DEVELOPMENT OF REASONING

The beginning of practical reasoning is found in the instinctive tendency to do under similar conditions what has been done previously with favorable results, and to refrain from doing what

has brought unfavorable results. A child, when uncomfortable, instinctively cries, and after a few months, if a continuation and increase of crying effort has always been followed by some one's coming to the rescue, habit establishes this method of obtaining relief. Some months later the child not only has this physiological tendency, but he is conscious of crying as one method of getting things, in much the same way that he is conscious of reaching, as a means of getting objects. A year or two later the child may be so conscious of crying as a means which has secured desired ends, that he makes the cry with a purpose, instead of merely allowing it free course or increasing the instinctive tendency to cry. In this the child's reasoning is not much beyond that of an intelligent dog which lies down, rolls over, or "speaks" for a piece of bread.

In all the child's experiences during the first few years, as he learns to reach for things, keep them from falling, maintain his own equilibrium in various positions, walk, climb, fall without getting hurt, avoid the stove, use a spoon, or pile up blocks, instinct and habit are the basis of the practical reason which is developing in a remarkable degree.

On the conscious side the child is guided by sensations, percepts, and images of particular experiences that were like those now occurring. He usually knows practically that things have to be held or something put under them or they will fall, by the middle of the second year; but it is many years before he actually thinks the general truth, "unsupported bodies fall," though he soon has representations of particular, unsupported bodies falling. Hence, though children make practical inferences at an early age, it is often a long time before they analyze and generalize so as to reason in an abstract way.

As soon as children begin to learn language they are implicitly generalizing, classifying, and reasoning as they apply the words to new objects. Probably not until between three and four

years of age do children begin to consciously and explicitly generalize, and then the generalization consists, at first, of several similar particulars, as the following remarks of a little girl when about three and a half years old indicate. After having often asked and been answered as to where various things came from, she asked, "Where did I come from?" and was answered, "You grew." Later she asked: "Where did papa come from?" "Where did mamma come from?" "Where did grandma come from?" Later when told the baby had two legs, she asked: "How many legs has papa?" "How many legs has mamma?" and so on for the several members of the family. At this time general statements did not satisfy her. When told she did things for papa, she asked, "What do I do for you?" and would not be satisfied with the answer, "Lots of things," till a particular thing, "You get the paper for me," was named. A few days later such remarks as the following were common: "When I get big I will go to the gymnasium, the library, the normal school, kindergarten and *lots of places*," showing that her ideas were getting slightly broader and more general than the particulars named.

A little later a conscious attempt to generalize and classify was indicated by the following: "The coffee pot won't break, but the cup will break and the saucer will break and the sauce dish will break," etc. The crudeness of her ideas, however, was shown by the fact that when questioned, she said that the silver sugar bowl and pitcher, and even a spoon would break, notwithstanding she had often dropped spoons without their breaking. Practically, she handled cups and spoons differently; but when she talked of them consciously, no memory of different experiences with them occurred to her to prevent her putting them both in the class of breakables.

In all the earlier attempts at reasoning, images of past experiences compose most of the "train of reasoning," and personal

actions or commands to self are transferred to others, or of others to self, as the following examples illustrate. To papa, "You eat something else first, then you can have some cake." Having been told that she could have something when it was noon, she later asked, "Has noon gone?" — "No, noon is coming." — "Has noon footies?" — "No." — "How does the noon come, then?" perhaps thinking vaguely of other ways of coming, as by means of wheels. It was explained to her that we called it noon when the sun got up high so we had to look up straight to see it. Several times after that on cloudy days she said at dinner that it was not noon, for she could not see the sun, which shows how largely her "thoughts" consisted of definite sensations and images. One day the following conversation between her and her father occurred: "When I get big, I will pop the corn and you won't have to do it, will you?" — "No." — "You will be a little girl then, won't you?" — "No." — "Yes, you will." She had previously learned that she would get big, and that papa had been little, and she had often changed places with others, as, "You hide now, and I'll find you," and so she probably pictured herself as a big man popping corn, and papa as a little girl standing by as she was then.

The child is continually gaining new truths that are general in the sense that they can be applied to a number of particulars; his conceptions are increasing in number and passing from the first to the second stage of definiteness, as he becomes conscious of common characteristics and important differences in various classes of objects; and he is continually trying to find out and apply general truths, though he often discovers that their application is more limited than he expected, as when he goes out in the rain so he will grow, or plants money or a ring expecting it to produce more.

In the following from a boy of four who has an unusual tendency to generalize, the induction seemed to be conscious:

"All things that will run, like water and milk, will wet, won't they, papa?"

The child gets his general truths (1) from practical experiences, without being conscious of them as general truths; (2) from adults, perhaps in answers to such questions as: "Where do apples come from?" "What are you putting that pie in the stove for?" "What is it made of?" "What makes flowers grow?" and (3) from his own generalizations and inductions, though these are often more a recognition of similarity of particulars than genuine abstract generalizations. In other words, he goes from one particular to another, instead of reaching a generalization inductively, then applying it deductively as does the logician. For example, a boy of five who saw white caps in the water overflowing a meadow, and asked, "Is there soap under every one of those waves?" evidently remembered other appearances like that, produced by soap in water. He thought of the same cause in this case without going through any such logical course of reasoning as the following: (1) (inductive) "I have observed such appearances produced in water by soap and by nothing else. What is true of the cases I have observed is true of all; therefore, such white stuff on the water is always produced by soap." (2) (deductive) "White stuff on the water is always caused by soap; that water has white stuff on it, therefore there must be soap in it."

Whatever the source of the general truth involved in a child's reasoning, he is likely to apply it not only to the class of objects or conditions to which it belongs, but also to others, and many of his mistakes in reasoning are due to this fact. This is not because his generalizations are so wide, as one might think, but because they are so indefinite and undiscriminating, as are also the concepts with which they are concerned; hence as soon as he notes similarity to something familiar, and pictures what was true of it, he expects that the same will be true of what seems like it.

This is true even when the similarity is only in name. For example, a little girl of five, who had borrowed an eraser of a young lady several times, was told that a plant in the window was a rubber plant, when she quickly exclaimed, "Oh, that's why you always have so many rubbers, isn't it?"

In other instances the characteristic to which the truth is attached is not an essential one; hence the truth is wrongly and often too narrowly applied, as when a boy of eight said, "You should not call him Mr., he is not married yet." In reality this and many similar mistakes come from too wide a generalization previously made, which in this case probably was, women who are married change their title; hence all persons do so.

The numerous mistakes in reasoning which a child makes often lead to his being laughed at, and this tends to discourage him somewhat in original thinking, and to make him rely more upon others for his general truths.

When he enters school the conditions are usually unfavorable for developing his power and tendency to reason. Before this, his practical reason was exercised in his plays and experiences with real objects and situations, and his conclusions were usually of immediate value to him. Though some of his reasoning had been conscious, and some of his thinking animated by pure curiosity, yet much of it had been influenced by practical interest of some kind, while nearly all of it had been concerned with persons, things, and incidents in his immediate environment. In school, conscious reasoning is usually appealed to, and there are almost no opportunities for the child to use his practical reason in doing things. The school studies, especially arithmetic, are supposed to be adapted to the development of the child's reason; but the appeal is almost wholly to conscious reasoning, which, unaided by the practical reason and the stimulus of interest in the conclusions which always accompanies reasoning in acts instead of in thought, is not very vigorous.

His arithmetical thinking is also very imperfect because it is not usually appealed to sufficiently through the senses and through images of definite individual experiences, which, as we have already seen, naturally occupy a large place in a child's reasoning. So many truths are presented to him, and they are applied so often without the results or conclusions having any bearing upon his present actions, that he does not care particularly what the truth is, or how it is applied, providing he can say or do what will satisfy the teacher. In short, the effect of school life is usually inimical to the activity of reasoning, at least for a time.

The ordinary child in the public school exercises his practical reason less in the first half-dozen years of school life than does the ordinary street urchin. Yet the schoolboy acquires a great many valuable concepts and general truths, and forms habits of orderly analysis and synthesis which enable him, when his reason awakens to full activity again (as it is likely to do in his teens), to far surpass the street urchin, not only in more abstract reasoning, but, with some practice, in the reasoning involved in practical affairs. The training in the school is not, therefore, valueless, but it produces a break in the development of reasoning which is sometimes never even apparently repaired.

Naturally, reasoning is first instinctive, sensory, and practical, then conscious, imaginative, and individual, and finally abstract, analytic, and general. The school unsuccessfully seeks to develop the last form of reasoning before the others, which are a necessary basis for it, are sufficiently developed.

After about twelve years of age, a child's interests usually broaden so that he is no longer almost wholly concerned with his own affairs and with particular results, but begins to develop a social and speculative interest in groups of persons and classes of objects and events. By this time the child has also acquired enough concepts and general truths, together with the power of analyzing and discriminating difference and likeness, so that he

now has the ability as well as the impulse to reason in a general and abstract way concerning persons in history, words in language, and things in science.

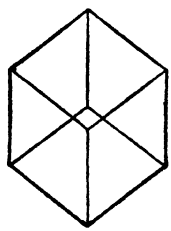
What is needed more than anything else to develop the reasoning power of children in school is that they shall have more opportunity to work out for themselves methods of doing things which they are immediately interested in doing, and more practice in discovering the results of particular acts and conditions, before they are expected to reason in an abstract way about classes of things in which they have no immediate or practical interest. It is also important, especially in arithmetic, that they shall have much practice in applying general truths to various classes of problems, without anything to show them which general truth will fit each particular case. In other words, their need is not more general truths, but more practice in discerning essential characteristics and applying truths.

Exercises for Students

1. If similarity in mental processes helps one person in understanding another, are teachers who are studying some new subject likely to succeed better in teaching than those who are not? Why?

2. Give a number of illustrations of special training which does or does not increase general mental power.

3. As a means of showing that our perceptions become definite regarding familiar things, note the fact that a figure like the accompanying one may be seen in two or three definite and familiar ways, but not in any intermediate or confused way. Note, also, how easy it is to hear sounds and nonsense syllables as words. Is this true to the same extent of children?



4. Give illustrations of differences in the discrimination of individuals, and indicate how far they may be explained by special knowledge and practice.

5. Test first or second grade children and adults by having them make straight lines, then words, as many times as possible in a minute, and note the difference in the two cases in the rate of children and adults and the causes of the difference.

6. Report tests and observations showing difference in mental grasp of children and adults.

7. Give illustrations showing that differences in the perceptive power of adults may be as great as are to be found between children and adults.

8. Why do people who have never studied drawing usually say that a circle looks the same in all positions? Give other illustrations of the ignoring of variations in sensations, in perceiving objects as the same.

9. Have students experiment and report on weight and size illusions.

10. Show children successively sticks of the following length in inches 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, 4, 4, 4, and see if they get the suggestion, that each line is to be longer than each of the preceding. Show a series of lines drawn on paper, of the above lengths, and ask the children to point to one three inches long, then just as the child is doing so, say, " Are you sure you are right? " Report other observations and experiments showing the greater suggestibility of children as compared with adults.

11. Show to adults for a moment the name of your city or some other familiar word, with some letters omitted and similar ones substituted, and see if familiarity with the words does not lead to error. Report other observations and experiments showing that knowledge and habit may lead to error.

12. To get an idea of how large a part purpose plays in perception, look at a book with one after another of the following purposes: to know the name and author, to know regarding the capitalization of letters, the size of letters, spacing and design on the back, to determine the quality of the binding as to material and color, to see if the book is perfectly new and clean, to see if its edge is smooth and straight so it can be used in place of a ruler, to determine its size in inches, to judge of the quality of the paper. Find other illustrations of how the purpose in perceiving, rather than the mere power of discrimination, determines what shall be perceived.

13. Is there any relation between manual training and sense training? Explain fully.

14. Give illustrations of the imaging power of children.

15. Is your image of a wooded hill that you have seen many times at various seasons of the year as definite and vivid as some landscapes you have seen only a few times? Give other illustrations showing how increased experience may lead to less definiteness and vividness of images.

16. Report from experience, observation, or reading, instances of letters or numbers, which always call up images of certain colors or forms.

17. Is it better to tell children of the second, third, or fourth grades something you wish them to remember, or to have them read it? Why?

18. Try with children and adults some such experiment as the following. Say, "Make a dot two inches from the top of the page and one inch from the left edge, then from it draw a line to the right two inches long, then downward three inches, then to the left one inch, then upward an inch, then to the dot first made," and see how well they follow directions; or say, "Think of a square with a triangle on top with point upward, a circle underneath, and an oblong on each side with ends next the side of the square."

19. Illustrate from school work, successes or failures of children due to good or poor constructive imagination.

20. What is the effect on the creative imagination of always telling children not only what to do, but also just how to do it?

21. Mention a number of exercises that you think would give good training to the creative imagination, in which you recognize a stage of imitation and practice, and another stage of free creation, indicating the grade to which these exercises would be most suitable.

22. Find how many words a child of two uses, as an indication of the number of concepts he has.

23. Attempt to determine what concepts of common things, of the second degree of definiteness, a child of from four to six has.

24. It will be interesting for students to try to gain some idea of how many concepts they have by counting the words familiar to them in a list of one or more hundred words taken by chance from the dictionary, *e.g.*, the first word on every fourth page, and estimating their total vocabulary.

25. Give a number of instances of childish reasoning from observation or reading, and explain the modes of reaching a conclusion in each case.

26. Give illustrations of work in school studies, so planned that the reasoning may be simply a means to an end the child desires to reach.

27. Give such problems as these to children, and explain why they make mistakes. "A boy walked directly east three miles, then directly west three miles. How far was he from where he started?" "If a stalk of corn two feet high grows two feet in the month of July, how much will a peach tree three feet high grow in the same time?"

28. Algebra may be described as arithmetic generalized. Why is it better suited for older pupils than arithmetic?

29. Have children find out what you are thinking of by asking questions that you answer by yes or no. Notice how many of their questions are particular or ignore former answers, and hence show lack of conceptional thought and reasoning.

30. Tell a story, such as the following, with many contradictions in it,

and ask children to give their reasons for thinking it is or is not true. Notice in how few cases they put parts together so as to show their logical contradictions. "The water would not be very warm if it was winter" is a logical reason, while "His father would not have praised him" is merely reasoning according to probabilities.

A Boy's First Fish

One winter afternoon a boy went fishing in a lake a short distance from his home. He had a bent pin for a hook, and a thread for a line, which he fastened to a good strong pole. As soon as he threw the hook in, a fish took it in his mouth and started downstream. The boy began to pull, but his foot slipped and he fell into the river. He was frightened at first, but when he found that the river was shallow and the water very warm, he did not care, but held to the pole. He waded to the shore and pulled till the pole bent and almost broke before he could draw the fish out of the lake. When he got it out he saw that it was about eight inches long and he was very much pleased. He tried to catch more, but they would not take the hook. His hands got cold in the wintry wind, so he started home with the fish. He got very tired carrying the heavy fish so far, but forgot all about it when he got home, and his papa praised him for holding to the pole, and his mamma said the fish would make several nice meals for all of them.

Note. A good review of the preceding portion of this book may be had by having students group the facts they have learned so as to show the stage of development reached at one, three, six, nine, twelve, fifteen, and eighteen and by observing and testing one or more children of the age chosen for special study.

Suggestions for Reading

On the general subject of intellectual development and training, see besides psychologies, Baldwin, Vol. I, pp. 301–332; Hinsdale, *Studies in Education*, chaps. ii and iii; and *Ed. Rev.*, Vol. VIII, pp. 128–142; Judd, chaps. i and ii; Compayre, Vol. I, chaps. vi and vii, Vol. II; Thorndike, *Human Nature Club*, chap. xv; *Jr. Ped.*, Vol. XIV, pp. 60–65; Thorndike and Woodworth, *Psych. Rev.*, Vol. VIII, pp. 247–261, 384–395, 553–564; Aiken, "Methods of Mind Training"; Allen, *Jr. Ped.*, Vol. XIV, pp. 237–254; Bergstrom, *Am. Jr. Psych.*, Vol. V, pp. 356–369; Swift, *Ped. Sem.*, Vol. X, pp. 3–22; Hugh, *Ped. Sem.*, Vol. V, pp. 599–605; Bryan and Harter, *Psych. Rev.*, Vol. IV, pp. 27–53, Vol. VI, pp. 345–375; Andrews, *Am. Jr. Psych.*, Vol. XIV, pp. 121–

149; Johnson, *Yale Studies*, Vol. VI, pp. 51–103; Swift, *Am. Jr. Psych.*, Vol. XIV, pp. 201–251.

On the senses and early intellectual development, consult Preyer, Shinn, Tracy, Moore.

On discrimination, rate of mental activity, perception, suggestion, and illusions, read Kirkpatrick, *Psych. Rev.*, Vol. VIII, pp. 563–577, Vol. VII, pp. 274–280; parts of Gilbert, *Yale Studies*, Vol. II, pp. 40–100; *Iowa Univ. Studies*, Vol. II, pp. 1–84; Christopher and Smedley's *Reports of Child Study Investigations to the Chicago Board of Education;* Judd, *Psych. Rev.*, Vol. IX, pp. 27–39; Small, *Ped. Sem.*, Vol. IV, pp. 176–220; *N. W. Mo.*, Vol. IX, pp. 134–135; Sidis, *Psychology of Suggestion;* Bolton, *Psych. Rev.*, Vol. VIII, pp. 537–548; Jastrow, *Fact and Fable in Psychology*, pp. 106–136, 275–295; Binet, *Psych. Rev.*, Vol. VIII, pp. 610–616; Pillsbury, *Am. Jr. Psych.*, Vol. VIII, pp. 315–393; Dressler, *Am. Jr. Psych.*, Vol. VI, pp. 343–363; Seashore, *Yale Studies*, Vol. III, pp. 1–67; *Iowa Studies*, Vol. II, pp. 1–64.

On mental images, see Galton, *Pop. Sci. Mo.*, Vol. XV, p. 532; Vol. XVIII, p. 64, or consult his *Human Faculty;* Patrick, *Pop. Sci. Mo.*, Vol. XXXIX, p. 761; Kirkpatrick, *Science*, October, 1893; Binet, *Pop. Sci. Mo.*, Vol. LI, pp. 539–544; Bryan, *N. E. A.*, 1893, pp. 779–781; Talbot, *Am. Jr. Psych.*, Vol. VIII, pp. 414–417; Hall, F. H., *Jr. Ped.*, Vol. XIV, pp. 214–223; *N. E. A.*, 1897, pp. 621–628; *Ch. S. Mo.*, Vol. VI, pp. 297–307; Wylie, *Ped. Sem.*, Vol. IX, pp. 127–160; Jastrow, *Fact and Fable in Psychology*, pp. 337–370; Philipps, *Am. Jr. Psych.*, Vol. VIII, pp. 506–527; Wolfe, *Am. Jr. Psych.*, Vol. IX, pp. 137–166.

On memory, see Colgrove, especially chap. v; Eldridge-Green, *Memory and its Cultivation*, Part I, chaps. vii and viii and Part II; Waldstein, *The Subconscious Self;* Bolton, *Am. Jr. Psych.*, Vol. IV, pp. 362–380; Shaw, *Ped. Sem.*, Vol. IV, pp. 61–78; Kirkpatrick, *Psych. Rev.*, Vol. I, pp. 602–609; Jastrow, *Ed. Rev.*, Vol. II, pp. 442–452; Patrick, *Ed. Rev.*, Vol. IV, pp. 463–474; Barnes, *Studies in Ed.*, pp. 58–61; Jacobs, *Mind*, Vol. XII, pp. 75–82.

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CHAPTER XVII

INDIVIDUALITY

SIGNIFICANCE OF THE TERM

WHATEVER has a separate existence so that it cannot be divided or fused with something else, without losing its essential unity, has individuality. A pebble, therefore, has some individuality, while a drop of water has none. Again, in order to have individuality, an object must not only have a unitary and separate existence, but it must differ from every other unit. Coins, as they roll from the mint, have no individuality, for each is exactly like the other. The products of machines generally lack individuality, while hand-made goods and the products of organic nature all possess some individuality. No two leaves are ever found exactly alike.

Difference from other similar units is one essential element in individuality. The difference may be slight or great, and in one or many characteristics. The more characteristics a thing possesses, the greater are the chances for difference or individuality. A mere point can differ from another point in position only, while a line may differ from other lines in position, direction, and length, and a rectangle from other rectangles in position, length, breadth, and proportion of length to breadth. A material object of rectangular form may also differ from other rectangular objects, in composition, weight, thickness, color, and smoothness. Organic objects may differ in all these ways and also in origin, manner of growth, length of life, etc. It follows, therefore, that the most complex things may be most

unlike; hence man, the most complex of animals, has the greatest individuality of all. This is true of the body, and with still more truth may we say, "every human soul is unique."

Although a description of the peculiarities of an individual, as compared with the corresponding qualities in others of his kind, is the easiest way of showing his individuality, it is in a way superficial. Individuality depends more upon harmony and unity of qualities, or their lack, than it does upon the degree in which each quality is possessed, as compared with the average person. The permanency of the particular *organization* of qualities is also another measure of individuality. In the latter respect individuality increases with age.

BIOLOGICAL VALUE OF INDIVIDUALITY

Biologically, the significance of individuality is as great as that of heredity. If every individual of a new generation were exactly like its parents, evolution would be impossible. An almost infinite variety of individuals must be produced in order that the fundamental principle of evolution, *i.e.* natural selection, may act effectively. Probably not one acorn in a thousand sprouts and takes root, and not more than one in a hundred of those that do, ever reach the proportions of a full-sized oak. The loss of buds and branches in each individual oak is almost equally great. In the animal world the loss is scarcely less, especially in the lower forms of animal life. If all grasshoppers' eggs matured, the globe would be buried with them in a few years. Which of these vast multitudes of young creatures of each species shall survive, seems entirely a matter of chance, or, in other words, of temporary and local conditions; but such is not the case. No two organisms, from the tiniest leaf or seed, and the smallest bug, to the most complex of all beings, — man, — are exactly alike. Despite their similarity every member of each species has some individuality. Those having character-

istics in the slightest degree more suitable to the constant conditions of life, are most likely to be preserved to produce others with some of the same characteristics.

The enormous loss of life in each new generation is therefore not wholly useless, for those animals that survive have the characteristics which fit them to live successfully in the environment into which they were born, while those that perished were in the main less favorably endowed. The continued existence of the species, so long as conditions remain the same, is thus assured. If conditions change, some individuals are likely to survive and produce descendants, whereas, if all were alike, all would perish. The selection, for survival, of those best suited to the new conditions, results in further evolution of the species and its more complete adaptation to the new life conditions.

To the human race, individuality is even more important, for not only does it favor physical evolution, but also social progress. If there were no persons differing from the common mass of mankind, to serve as leaders and models for imitation, changes in customs and modes of thinking would be impossible. Progress would come to an eternal standstill.

COMMONALITY AND INDIVIDUALITY

Every person, as Shylock eloquently shows, has the essential characteristics of a common humanity as well as individual peculiarities. Physically, all have body, limbs, head, and internal organs; but the absolute and relative size of each are never the same in two individuals.

In height, men vary from three feet to eight feet, and in weight, from fifty to five hundred pounds. The average child at birth weighs about seven pounds, but an individual child may weigh anywhere from two to twenty pounds. Although about seventy per cent of the children in a first grade may be comfortable in the average seat for that grade, some individuals will require

much smaller seats, and others, seats as large as are usually required in a sixth-grade room. The average pulse beat of men is seventy, but it may be forty or over a hundred. Differences equally great are found in every organ and process, and in the relation of parts and processes to each other, *e.g.* a man six feet high may have a shorter body than one only five and a half feet in height. Indeed, it is difference in proportion of parts rather than in absolute size that enables us to distinguish one individual from another.

Even the very elements of which bone and muscle are composed differ in different persons; hence the combination of these elements into organs of different sizes must give rise to still greater differences in physiological processes, temperaments, movements, sensations, thoughts, emotions, and actions.

Shoe dealers, doctors, teachers, and preachers would find their tasks much simplified (though rather dull and mechanical) if there were complete uniformity. Society would be quite democratic. There would be no idiots and no geniuses, no criminals and no philanthropists, no radicals and no conservatives. Methods of work and modes of worship would soon alike be mechanically regulated and continued without change.

On the other hand, in a country where there is great individuality and no uniformity, governments exist only by force. Common processes, standards and laws are impossible; there is no peace except that of tyranny and subjection, and no permanency beyond the life of the dominant individual. A certain amount of uniformity is therefore necessary to the stability and peace of the social organism, while individuality is equally necessary if it is to be progressive.

Looking at the matter simply from the standpoint of individual happiness, the person who is like his fellows in nearly all respects is in harmony with his social environment, and so far as that is concerned, is at least negatively happy. The person

who differs greatly from his fellows in knowledge, temperament, habits, and ideals is shut off from any real companionship, because there are none of his kind with whom to associate. He is irritated by their monotonous lives, and they, by his eccentricities; hence the man of genius is often miserable. The person who differs from his fellows by inferiority is even more unfortunate if he realizes it. Perhaps there is least comfort for the man who is neither superior nor inferior, but simply different. To be happy, a man must have much in common with his fellows; and to be useful, he must have also something which they have not. It follows, therefore, that not only does the stability and improvement of the social organism depend upon the presence of both common characteristics and individual peculiarities, but so also does the welfare and happiness of the individuals composing the social organism.

FACTORS PRODUCING COMMONALITY AND INDIVIDUALITY

Heredity favors uniformity in proportion to the oldness and pureness of the ancestral line, while mixed parentage results in greater differences in the offspring. In no case, however, are all the children of the same parents exactly alike, even at birth. How far these differences are due to germ heredity, and how far to prenatal influences, we do not know; but the fact remains that every person has in some degree native or congenital individuality.

Experience, *training*, and *teaching*, in so far as they are uniform, favor commonality. Where the climate, industries, customs, laws, religion, and sources of knowledge as the schools and the press, are the same, the people will inevitably be more nearly of a single type.

Though there are *natural* and *social influences* tending to produce commonality, yet a greater or less degree of individuality is found in every home, community, and nation because (1)

congenital differences cause the individuals to react in various ways to the common external influences; (2) differences in treatment result from these congenital peculiarities (*e.g.* a bright child is asked to do things a dull one is not, and a quarrelsome child is treated differently from an even-tempered one by his companions), and (3) chance influences (such as being the youngest or oldest in the family, and special accidents or events that affect one child and not another, or that occur at a different stage of development) give a different form to each character. Slight differences may produce, ultimately, enormous individual variations. The truth: "To him that hath shall be given," is of wide application. A uniform environment makes for commonality, but on account of individual differences the various influences are in some cases almost nil in their effects and very impressive in others; hence under the same treatment children may increase and confirm marked individual peculiarities.

TIME OF GREATEST INDIVIDUALITY

It is hard to say at what age individuality is greatest. In adults there is much more of the harmony and unity of characteristics that make an individual a person, instead of a mass of partly related phenomena, than in the case of an infant. The individuality is also more fixed, so that it is less modifiable by surroundings. In children, individuality is less because the child's nature is simpler and many of his peculiarities are transient. On the other hand, the child's individuality is greater in some ways because he has not been subjected to the many years of social training and education that have tended to make adults all alike. The new instincts which develop as the years pass, increase the possibility of individual differences in a way that partially balances the influences tending to uniformity.

Measurements and tests show greater individual differences for young children, and for those just entering their teens, than

for other ages. This is largely accounted for by the fact that rapid changes are occurring at these ages, and by the fact that such changes begin earlier in some children than in others. About three times as many children are of the mean weight at eight years of age as at fifteen; while the difference in weight between the largest and the smallest boy at fifteen is about twice as great as between the largest and smallest boy at eight. The changes being slow for the years just before and after eight, a difference of a year or two in the time of entering upon a new stage of development makes only slight individual difference in children of that age, while at about fifteen the changes are so great that the difference between one who is a year late and one who is a year early in his development is very marked.

Physiological studies show also that adolescents differ greatly from each other in thought, feeling, and action; and history testifies that many inventions and innovations have been made by adolescents. We therefore conclude that, everything considered, individuality in the sense of variations from the average is greatest during the adolescent period. Some persons who resist common influences, and continue to develop their own peculiarities, show the greatest individuality in maturity or old age; but the majority become more and more like their fellows in general society, and like their co-workers in their occupation, but more fixed in the phases of individuality that they retain.

GENERAL AND PARTICULAR TRUTHS REGARDING CHILDREN

The anatomist, physiologist, psychologist, and moralist make many generalizations as to what is true of the average man; but no individual will be found who is in all particulars an average man. The generalizations are not false or useless, but eminently true and valuable, since they give a mean or standard to which the great majority of men approximately conform. Where there

is one man between seven and eight feet high, there are hundreds of thousands between five and six feet. It is thus practical to construct doors, chairs, and beds to suit the majority of men. The variations in proportion of parts are greater, yet the majority of men can be fairly well fitted with ready-made clothing. A perfect fit, however, requires individual measurement, and in a few cases such measurement is necessary in order for the clothes to be worn at all.

Standards regarding physical processes are of great value in medicine as indices of physical health; yet physicians find it necessary to determine the normal standards of individuals in order to properly diagnose and prescribe successfully.

Generalizations regarding the mental power and the moral worth of the average man are of immense value in practical and social life, yet individuality must be recognized in explaining or appealing to men, to a greater extent than in manufacturing furniture and clothing, or in prescribing food, medicine, and exercise.

Scientific students of children are trying to make generalizations in the realms of anatomy, physiology, psychology, and morals as to the characteristics most prominent at different ages. Such generalizations, when carefully made, are valuable as standards of comparison. They are not, however, models to which individuals should be made to conform, any more than men should be made over to fit coats, chairs, or the size of pills. On the contrary, the results of child-study investigations have always emphasized the greatness of individual difference in children and the need of recognizing it. For example, though carefully prepared tables show that the average boy of eight is forty-seven inches high, yet individuals of that age are found fifty-five inches in height, which is equal to that of the average twelve-year-old; and others, only thirty-five inches, or less than the height of the average three-year-old. Tests show

that the average boy of the sixth grade can work so many examples of a certain kind in two minutes. This is a valuable standard for comparing the arithmetical attainments of children, but no reason whatever for trying to bring all children to that standard.

After the sixth year, the fifteenth year is for the average boy the year of most rapid growth; but individual boys begin to grow more rapidly as early as the twelfth year, and others as late as the nineteenth. Again, the average boy grows about three inches in his fifteenth year; but individuals have been known to grow thirteen inches in that year. Tests of rate of movement, strength, endurance, sensitiveness, discrimination, and memory show increase during school age of from two to five fold; yet nearly as great differences are found between the poorest and the best individuals of each age. In nearly all tests of children of different school grades, even where the change with grade is marked and fairly regular, one usually finds nearly as wide a divergence between children in the same grade as between the averages for the lowest and the highest grades.

Children usually learn to walk when a little over a year old, but some begin as early as seven months, and others not until nearly two years of age. At two years, most children use three or four hundred words; but some do not use a dozen, and others, more than a thousand. Most children show marked mental changes soon after entering the teens; but some show none, and others go through such changes long before or long after that time. Children who do well in their school work (according to Porter and Hastings) average larger than those who do poorly; but a dozen exceptions to this generalization could probably be found in almost every school. Fewer exceptions are found if the relation of breathing capacity to weight is considered. The time element makes all generalizations in child study more difficult than in mere anatomy, physiology, psychology, and ethics,

because the age at which changes take place varies greatly in different children; hence those who may, when mature, be much alike, are often quite different at certain periods of life, because one has entered upon a new stage of development much earlier than the other.

NECESSITY OF RECOGNIZING INDIVIDUALITY IN CHILDREN

Whether the teacher wishes to promote individuality or uniformity, she must (if she is to be in the highest degree successful) recognize individuality. Children are different to begin with; hence they react differently to the same treatment. In order to get them to react in the same way, so as to have uniform development, they must be appealed to differently. If a uniform standard is to be approached, certain characteristics must be fostered in some and suppressed in others. If the same knowledge and skill are to be obtained, different individuals must be allowed different periods of time for doing a given amount of work, because experiments show that the number of units of work that can be accomplished by some members of a class in a given time is from two to four times as great as can be accomplished by other students of the same class, and this even in a senior class of a high school supposed to be well graded. If all are to form habits of effort and industry, different requirements must therefore be made of different children; otherwise some will be forming habits of idleness, while others are overdoing or forming habits of "skimming." Difference in knowledge, as well as in natural powers and tendencies, must be recognized, or one will be confused where another is enlightened.

It is clear from the preceding that if one wishes uniform results from educational processes, he must recognize individuality. Much more, then, if one aims to develop individuality, must he recognize it at every step in the process. If, as in the highest ideals of education, it is desired to make each individual like his

fellows in all ways necessary to association with them, and different from them in all ways which his natural tendencies and position in life demand shall be different, there is double reason for recognizing individuality.

When we say individuality *must* be recognized, we mean the same, only with greater emphasis, as when we say each person must be measured in order that his clothing may be made to fit. We know, however, that the people of a city can be better fitted from a stock of ready-made clothing, which has been cut according to general principles governing the size and proportion of parts of the majority of men and boys, than they can be by a poor tailor who measures and tries to fit each one individually. He is only an artisan, and notwithstanding his opportunity for individual measurement his results are inferior to those of other artisans who make no measurements of individuals, but work according to general principles under the direction of experts. The best results can only be obtained by the expert tailor who is able to measure the individual accurately, apply general principles correctly, and exercise his judgment in making each garment a work of art. In a similar way, we may say that children may be taught more successfully in the mass, according to general principles under the supervision of an expert, than they can be taught individually by a poor teacher who has little knowledge of general principles of education, less ability in reading individual children, and no skill in dealing with them. The best results can be reached, however, only when the teacher is an artist and able to fit the work to individual needs, so that every child may be molded according to the same general type as other children, and developed so as to bring out the highest and best of his individual characteristics.

HOW COMMONALITY AND INDIVIDUALITY MAY BE DEVELOPED

To develop the common characteristics necessary to the maintenance of proper social relations, there must be some uniformity as to what is done and learned. All must at least learn a common language, and some of the fundamental customs of the nation. Many other things in our present course of study are more or less necessary and desirable, but none are so essential as means of communication and common traditions. A certain amount of knowledge of arithmetic, geography, etc., is also desirable as a common basis of understanding.

To preserve both commonality and individuality, the requirements in a few subjects of a course of study should be set at rather a low minimum, with no maximum and no time limit. In other words, most children may be expected to reach approximately certain minimum standards of knowledge and skill in fundamentals, but not necessarily in exactly the same time. To promote individuality, a child must be allowed and encouraged to go beyond the minimum in any line, and given opportunity for becoming interested and for working in other lines. In other words, instead of being held to ineffective attempts to make up deficiencies, he should be helped in advancing in the lines for which he has the greatest capacity.

TYPES OF INDIVIDUALITY

Since every one comes in contact with thousands of individuals of varying similarity and difference, it would be very convenient if one could classify them into a few types, and then deal with the individuals according to the types to which they belong. The classification most commonly used has been that of temperament, but unfortunately (or perhaps fortunately) few individuals exhibit exactly the characteristics ascribed to any one of the several temperaments. Some of the characteristics of

several temperaments are shown by one individual, and none of them in the same degree by any two. In many cases the best method of treatment may be more readily and accurately determined by studying the individual than by classifying him as belonging to a certain type.

The varieties of individuality are so great that psychology and child study can never tell teachers what they would most like to know — just how to deal with individual pupils. Science in its very nature is general; its goal is the discovery and statement of general rather than individual truths. Scientific knowledge is not, however, useless to the teacher; the more she knows of how most human beings act and develop, and of the characteristics most common at each stage of development, the more quickly and correctly will she be able to determine what is the best treatment for an individual child. Experience in dealing with other children more or less similar, will also be helpful in determining what to do with the child in question. The reading of how other children have been dealt with and the study of biographies and of novels that are true to life, may in part take the place of actual experience with children. From such experience and study one may form in his own mind a more practical classification of children than he can by trying to understand the types described by another.

Children are usually best described and managed according to prominent characteristics, rather than according to groups of qualities indicated by type names. It is much more important to the teacher to know whether a boy is slow or quick in his mental operations, than it is to know whether he has all the characteristics of the phlegmatic or of the nervous temperament. The accuracy and ease with which a pupil works, depend, more than anything else, upon the rate at which he is required to perform each operation. Often a pupil can work best and most easily at twice the rate that is best suited to his classmate. On

the other hand, the slow pupil may be able to maintain a steady, prolonged activity under direction, for a length of time utterly impossible to the pupil with the more agile mind. Experiments by Davis indicate that persons who are quick in their reactions gain more in muscular power by light than by heavy practice, while those who are slow gain most by heavy practice. Experiments on fatigue also indicate that quickly reacting individuals show more extreme and sudden variations in fatigue than those who are slow. Observation also indicates that slow individuals often improve under stimulus and direction, while the quicker pupil may be so excited and disturbed by stimulation and close supervision that he makes many mistakes and wastes much energy.

Of course there are large numbers of children who are neither especially quick nor slow, and who are therefore most helped by an intermediate mode of treatment. The final test of the suitability of any method of treatment for a child is the effect which it is observed to have upon him; hence no study of generalizations and types of individuality can ever render unnecessary the observation of individuals.

Exercises for Students

1. State some examples of individuality that you have observed in plants or animals.

2. If plants of the same variety were all alike, would it be possible to improve the variety? Why?

3. Give not less than six examples of *extreme* variation of some kind in people. Are any of these persons treated differently because of their peculiarity?

4. Discuss the advantages and disadvantages of uniformity and individuality in ability, beliefs, and customs in a community, so far as they may be produced by education and law.

5. Give illustrations of persons who were miserable because of their difference from other persons, of those who were useless for lack of it, and

of those interesting or influential because of it. Do leaders have much, little, or a medium individuality?

6. Give illustrations of individuality due to heredity, to acceleration or retardation in development, to surroundings, to chance circumstances, to congenital peculiarity. Is it of any value to the teacher to know the causes of individuality? Why?

Have the people of the United States more or less individuality than those of other nations? Why? Mention the various factors tending to make them have more or less individuality than the people of England.

7. As regards permanency or degree of individuality, what would be true of the following: a radical? a conservative? a man set in his way? a genius? an imbecile? a saint? a criminal? an athlete? an invalid? a giant? a dwarf?

8. Do the following promote individuality or commonality: churches? lodges? public lectures? theaters? factories? shops of the Roycroft type? Name other things which produce uniformity or individuality.

9. In what respects is the individuality of a successful reformer like that of a crank or a martyr, and in what respects different?

10. At what age did you feel yourself most different from other people? If one goes into new social surroundings, is he likely to feel his individuality more or less? Why?

11. Give illustrations showing the value of knowledge of certain general truths regarding the characteristics of children of each age and grade, and also of the value of knowledge of individual peculiarities. Which do you think is of more advantage to a teacher, to know many general truths regarding children, or to be able to readily note and understand individual peculiarities?

12. If a class of children are to be prepared for the same examination, why should individuality be recognized? Illustrate.

13. In preparing a lesson, should a teacher think more of the common characteristics of a class or of their individual peculiarities? During the lesson which should she think more of? How can she best meet both class and individual needs?

14. What is the general effect upon individuality of allowing children to choose for themselves a good deal? Illustrate.

15. Describe some of the ways in which you have known individuality to be recognized and promoted in school.

Suggestions for Reading

On the nature and importance of individuality, see Bailey, *Psych. Rev.*, Vol. VI, pp. 649–651; *N. W. Mo.*, Vol. VIII, pp. 250–256, 370–375; Stanley, *Ed. Rev.*, Vol. XVIII, pp. 80–84; Howerth, *Jr. Ped.*, Vol. XIV, pp. 311–324; Doan, *Jr. Ped.*, Vol. XIV, pp. 13–33; Ribot, *Psychology of the Emotions*, pp. 380–404.

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Groszmann	Morgan, B.	
Healy	Partridge	

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CHAPTER XVIII

CHILD STUDY APPLIED IN SCHOOLS

USE OF TRUTHS KNOWN AND ACQUIRABLE

ALL the teacher's knowledge of physiology and psychology and of the characteristics usually prominent at different ages of childhood may be of use in knowing what to assume as true, what observations to make, and how to judge the significance of the facts discovered in studying children. In a similar way the less systematic knowledge of human nature and of children gained by association with them at different ages will naturally be used in getting acquainted with the special characteristics of a school as a whole and of the individual children composing it.

A teacher may in an *indirect* way make a valuable study of a school before she sees it. Knowing the grade she is to teach, she can infer the *age* of the majority of the children. From her knowledge of the principles of child study, she will know what characteristics are likely to be prominent at that age. This will give her some idea of the school, wherever it is located.

If the children are nearly all of one or two *nationalities*, this will tell her something about them. Physical and social heredity will inevitably endow them with the principal characteristics of the nation to which they belong. Any knowledge, therefore, the teacher may have or acquire of these nationalities will be helpful to her in understanding the children.

A knowledge of the community, its *occupations*, *social organizations*, and *amusements* will also be helpful. The imitative instinct makes it absolutely certain that the children will absorb

many phases of the social life by which they are surrounded. It is almost equally sure that they will know something of the objects of nature and art about them, and little of those of other places unless they have traveled, or have read with unusual intelligence. The fundamental apperceptive knowledge possessed by the children may therefore be determined by studying their natural as well as their social surroundings.

To know something of the *school knowledge* and training possessed by the pupils, the course of study and methods of teaching in the city or district may be studied. With some allowances for forgetting, pretty shrewd guesses as to what the children will know, can then be made.

The *schoolroom*, with all its possibilities for heating, lighting, ventilating, seating, illustrating, and decorating, should be studied as an important factor in determining what may be done with the school that is to inhabit it. Books and apparatus should also be considered in this connection.

OBSERVATION AND INCIDENTAL STUDY

When the children appear and begin their work, the teacher may study them in a *direct* way by observations, and thus supplement and correct with specific facts her previous conclusions. The majority of the children may prove to be either young or old for their grade, and their development may be greater or less than that usual for their ages, though the teacher's knowledge of their social surroundings should have prepared her for such variations as the latter. Their knowledge of natural surroundings and of school studies, when tested by reviews and questions, may also prove greater or less than was anticipated.

In regulating the school the teacher assumes that certain forms of control are necessary and that certain motives and influences may best be used in preserving order and in securing good work, but she should observe closely how the children re-

spond as a group and as individuals to directions, example, suggestions, reproofs, rewards, public sentiment, personal approval or group disapproval and individual group competition, curiosity, practical needs, play opportunities, etc., and modify her actions accordingly, preserving her ideals, but finding the most effective means of realizing them.

She should not confine her study of children to the schoolroom or even to the playground, but should seek to know as much as possible of the character of their activities outside of school. These facts may often be obtained indirectly through conversation with the children and through papers written by them.

Language exercises calling for information along these lines may be made very interesting to the children and valuable to the teacher who wishes her teaching to correct and supplement the incidental education given by the community. Such topics as the following, assigned at not too frequent intervals, will give the teacher a good idea of the activities and influences affecting the children when not in school. "What I like best to read, and why," "What I did last Saturday" (written on Monday), "What I did during vacation" (written just after vacation), "What I am going to do this vacation" (just before vacation), "What I do on school days outside of school hours," "The games that I like to play best, and why," "The best time I ever had," "What I am going to do when grown, and why," "Five things that are bad and wrong, and why," "Five things that are good and right, and why," "Some good acts and some bad acts that I have seen this week," "My experience in getting, keeping, and spending money," "What I would do with it if I received fifty cents a day for a month," "Which I would rather have, five dollars to-day, fifty dollars a year from to-day, or five hundred dollars in ten years, and why," "The kind of a playmate or chum I like best," "Pets that I have had and that I wish to have."

When a teacher first begins her work in a school, the children are slow in understanding her questions and directions, and it is generally recognized that it takes time for teacher and pupils to get used to each other. This "getting used to each other" means not merely greater familiarity, but the formation of *habits* by the pupils, in accordance with the teacher's habits of doing things and of expecting them to be done. Many of these are very obvious, such as signals for leaving the room, asking questions, position assumed in reading, writing, and putting away or getting books and material, answering questions, etc., and it probably is well for the teacher to consciously direct the formation of such of these formal school habits as she thinks necessary, in order that they may be quickly established and require little subsequent attention. Direction in forming these habits should consist not so much in description of the thing to be done as of practice in doing it at the proper time.

The pupils' modes of observing and thinking will be affected by the way in which the teacher questions, analyzes, and outlines, their feelings and sentiments influenced by those she holds and expresses, consciously and unconsciously, and their attentiveness, carefulness, and persistency determined to some extent by her example and her requirements. Every teacher should note the habits of thinking, feeling, and working, common to the school, that have been formed by the social environment and by previous school experiences and conditions, and should consciously strive to correct the undesirable ones and develop the good ones.

In attempting to break habits already formed, the teacher should remember that a habit is a tendency to do a certain thing *under certain conditions*, and hence that a change in the conditions giving rise to a habit will often change the habit. It is also much easier to learn to do something else under the conditions calling forth a habit than to refrain from doing anything, or, in other words, it is easier to change a habit than to

break it. It is therefore often wisest to say nothing about undesirable habits, but to change the conditions under which they appear, or to set the children to doing something which will erelong take the place of the undesirable habit. For example, children who are led to become interested in hearing or doing something do not need to be told not to gaze around the room or out of doors; and those who are learning to observe or care for animals will not long continue to practice cruelty toward them.

A teacher should be careful that the children do not get into the habit of holding her, instead of themselves, responsible for order. Very often they wait for a look or a word which has become a customary signal for them as individuals to do certain things. They are like a little three-year-old girl, who, after being reminded many times to stop before drinking all of her milk, said, when not so reminded, "Mamma, why don't you tell me to stop?"

In directing the formation of habits in which improvement with practice is desired, as in learning to write and draw, the teacher should be satisfied with the work as long as it shows improvement, but should be very careful when improvement stops, because one of two undesirable results is likely to appear: either the habit with its imperfect execution becomes fixed by repetition, so that after a time it is almost impossible to change it; or else when the volitional effort to do good work decreases, the execution begins to revert back to a less developed stage at which it may then become fixed. It should also be remembered that doing a thing well under one set of conditions does not necessarily mean that it will be done equally well under others; hence a pupil who writes well when writing in a copy book, may write very poorly when trying to express his ideas in a language lesson. The teacher should, therefore, see that habits are perfected under the conditions likely to exist when they are to be used.

After a teacher becomes quite familiar with her school, she still needs to study it to know what to do in *special circumstances*. She must be quick to discover signs of nervousness, restlessness, fatigue, or loss of interest; thorough in searching for the causes, whether they be in the physical conditions of the room or in something that has been done either in or out of school; and fertile in expedients for removing or counteracting undesirable influences.

If the cause of the difficulty should be in *herself*, she should be no less persistent in removing it. It is more important to the school that the teacher shall keep herself in good health and free from fatigue, nervousness, and worry than it is that she shall correct papers or even teach in the best possible manner.

If she is careless and unsystematic in her work, no amount of talking about neatness and order will make the children careful and orderly. If she calls, in a loud and irritated manner, for them to be quiet, she is really giving them a suggestion to become more noisy. If she is afraid the children will not obey her, the idea of disobeying is at once suggested to them by her voice and manner. Since natural signs have greater suggestive force for children than words, it is not strange that they are more influenced by the actions, manner, and tone of voice of the teacher than by what she says.

The effects upon the school of suggestion and imitation among the pupils themselves are also frequently very marked. The teacher should, therefore, study closely the *social* relations of her pupils, observing who seem to be leaders in the public sentiment of the school, and who are merely imitators and followers. Then she should make a special effort to understand the leaders so as to influence them, and in that way to direct the sentiment and actions of the school. She should arrange the seating of pupils also, so that there will be as little temptation as possible to visiting or other disturbance. All cases of chumming and

rivalry in individuals or of groups should be noted. In many schools it will be found that there are one or more societies formed by the children themselves, which not infrequently have special badges or passwords, and sometimes an extensive secret language. The teacher will find it interesting and profitable to become familiar with all these social relations of the little society of which she is the leader, and to note how the children are being influenced by them. She should seek to use, rather than to suppress, such social activities. Individual rivalries may not be ignored, but should not be encouraged; while rivalry between groups may be profitably encouraged when it leads to better coöperation of the members of each group, and is good-natured.

STUDY AND TREATMENT OF INDIVIDUAL CHILDREN

After the teacher has become so well acquainted with her school that she knows how to regulate it, and conduct the classes to the best advantage of the majority of the children, she should seek to know more of the exceptional and peculiar children whose needs are not being fully met, and to find ways of meeting their needs without interfering with the general school and class work. In doing this, she should never assent for one moment to the idea that all the children must be treated exactly alike. Everything she does should be for the good of each child, whether it be the assignment of a long or a short lesson, or the giving of a punishment or a reward. What will be the best training or the most effective corrective for one may not be for another; hence it is her duty to treat each pupil in the way that will cause him to improve most and on that basis justify her conduct.

In her study of the school as a whole, the teacher will have noticed children who show marked variations from the average in many ways. There are undoubtedly *causes* for each peculiarity, and the teacher should at once seek to discover them. She

should inquire into the past history and present conditions and surroundings to discover how far the child's peculiarities may be accounted for by heredity, sickness, accidents, previous school training, special home conditions, life outside of school, or present defects. Where the peculiarities are undesirable, their causes should be removed or counteracted as far as possible. Where they are in the nature of special interests or powers, the teacher should favor their development so far as may be without interfering with the development of other phases of the child's nature.

Much ingenuity is required to keep all the members of an average class interested and actively employed all of the time, because of difference in rate and accuracy of working; yet, if this is not done successfully, some children are confused, others waste their time, and disorder is almost sure to appear.

When, in addition to what may be called, for want of a better term, "average pupils," the teacher has many who are peculiar, defective, abnormal, or exceptional in some way, her difficulties are greatly increased. In almost every school there are children who can get little or nothing from the regular class work. Teachers, with the large number of pupils they usually have, cannot possibly meet fully the needs of such children without sacrificing the rest of the school.

It is therefore desirable that, in every city, *ungraded rooms* for individual instruction should be provided. About one room in every ten should be of this kind. Two types of ungraded schools are desirable: one for primary children, who are so defective or peculiar that they cannot get started to learning readily in an ordinary class; and one for grammar-grade children who are exceptional, principally in their rate of working or knowledge of special subjects, and who, therefore, need special training in one or more lines in order to be fitted for the next grade. With such provision many peculiar and backward children soon show themselves capable of great improvement, and children who have

in some way got behind in one or more subjects are enabled to pass from grade to grade without unnecessary loss of time. Where such schools are not provided, some children are sure to suffer, and some of the best teachers to worry, because of the impossibility of meeting both class and individual needs.

Not only should the backward children have special provision made for individual care, but also the talented children who are sometimes learning to waste time in doing only the regular work of the class. Such pupils should be given opportunity for a fuller exercise of their general and special talents, but should not by the educative advancement be shut off from association with companions of their own degree of physical and emotional maturity. Social experiences with others of one's own kind should never be sacrificed for merely intellectual acquisitions.

OBSERVATION OF FATIGUE AND NERVOUS STATES

Tests that would be of value to the ordinary teacher in determining the adaptability of her daily program to her children, and in discovering exceptional instances of fatigue in the school or in individual pupils, have been sought for several years. It may be safely said, however, that no method of discovering fatigue, that can be mechanically applied by a teacher, has been found. Such tests cannot take the place of intelligent common sense and good judgment on her part. She must not only be able to note the decrease in rate or accuracy of working, but must also learn to read the signs of oncoming fatigue, in the pupil's attitudes and movements.

The signs that appear first are variation and wandering of attention or increase in effort to attend, or in movements of a fidgety or restless character. The first is an indication of mental fatigue, and the last, of fatigue of muscles that have been contracted during the period of attention. Sometimes the increase of movement, especially when the fatigue is considerable,

is the result of increased irritability of the nerve centers, resulting in continual outflow of energy and many rather nervous responses to sudden auditory and other stimuli.

Other more or less common and significant signs of fatigue and exhaustion that the teacher may observe or learn by inquiry are as follows: jaded expression of face, drooping attitude, paleness or redness of cheeks or tips of ears; dazed, weary, fixed, or lack-luster appearance of the eyes; sudden movements, grimaces, frowning, compression of lips, twitching of the fingers, face, eyes, or eyelids; unsteadiness as shown in bad handwriting, mispronunciation and miscalling of words in talking and reading; headache, cold feet, sleeplessness, dreaming, teeth grinding, or talking in sleep; irritable, cross, or peevish disposition or moods; poor hearing and imperfect discrimination of words, sometimes with extreme sensitiveness to disturbing sounds; blurring of vision, color blindness, and double images; temporary loss of memory of familiar or recently stated names or facts; and failure of mental grasp, as indicated by inability to follow a chain of reasoning and a tendency to forget what one is going to say.

The test that is of greatest value to a teacher is one that shows the curve of fatigue in different children, because this throws much light on their individuality. One who fatigues very rapidly and recovers with equal suddenness, requires quite different treatment from one who fatigues very slowly and gradually.

Abnormal brain states, though themselves slight, show in expression and behavior. Impulses are continually going from the brain to every muscle, organ, and gland, as well as from each part of the body to the brain. Imperfect activity of the brain may, therefore, be shown in paleness of the face, slow growth of the body, and imperfect development of parts, as well as in attitude, and expression of face and movements; while, conversely, a defect or disturbance in any part of the body may affect brain activity unfavorably. It is well, therefore, to notice

not only the height and weight of a child for his age, and the color of the skin, but also the signs of imperfect development of organs, such as irregularities in shape of the head, narrow palate, broad bridge of the nose with small openings in nostrils, and imperfectly developed external ear; for, as Dr. Warner has shown, these are often associated with poor nutritive condition and mental dullness.

Even more important are what he calls "*nerve signs*," which indicate the amount of nervous energy being sent to the different muscles of the body, and hence the amount and regularity of the activity in different parts of the brain. Wrinkling of the forehead is always indicative of some brain disturbance, as are also irregular and meaningless movements of any part of the body; while a normal brain condition is shown by good attitude and well-balanced and coördinated movements, because this means that all parts of the brain are functioning vigorously, regularly, and harmoniously. Some of the more important "nerve signs" to be observed are: degree of erectness of body and head in standing or sitting; ability to hold hands straight out and evenly, palms down, without throwing the shoulders back and bending the spine forward; and to keep fingers and thumb straight without allowing them to droop or to bend back too much.

The effects of *poor nutrition* are much the same as of general fatigue, as far as the power to do the work of the school is concerned. The common signs are paleness, fullness under the eyes, fewness or irregularity of spontaneous movements, and lack of steadiness of control, or power of continued application. Poor nutrition may be the result: of lack of sleep; of lack of nutritious food; of indigestion, due to irregular eating of indigestible food; or to a diseased condition otherwise produced. In all such cases the teacher may try to secure a change in home conditions and habits, which will make it possible for the child

to do the work and conform to the discipline of the school, or, this failing, she may modify the requirements for the child so that he will not be overfatigued, and his condition made worse rather than better by attendance at school.

Nervousness is a common result of fatigue, either general or local, and of poor nutrition. Even when the nervousness is hereditary, it is always increased by these conditions. Nervousness is a condition of increased irritability of nerve centers, and is shown by excessive movement in response to stimuli, especially sudden sounds, and in lack of steady and perfect control of movement. Restlessness, or a strong tendency to move about a great deal, is sometimes mistaken for nervousness, though one is due to excess of nervous energy and the other to irritability of nerve centers. Either nervousness or restlessness may be produced by trying to keep still in a certain position, or by engaging in fine work that necessitates holding the larger muscles steady and moving accurately a group of smaller ones.

The strong, restless child may be benefited greatly, so far as ability to behave and study is concerned, by an interval of vigorous exercise; while the nervous child would be exhausted and quite unfitted for the next work by such vigorous activity. He should have instead mild exercise, or a chance for quiet rest. It is especially important that the nervous child should not be scolded, found fault with, or in any way induced to work hard or worry about his work. A teacher who is loud of voice, unattractive in dress, and sudden and variable in manner is especially irritating to a nervous child, and may be the chief occasion of the nervousness. Although a teacher should be quick to note signs of nervousness, she should avoid making the child conscious of his condition. The establishment of regular habits of work and of rest or amusement are of great value in decreasing nervousness.

Chorea or *St. Vitus's dance* is somewhat allied, in appearance

and cause, to nervousness; yet it is a disease rather than a temporary condition. It is not, like nervousness, due to general irritability of the nerve centers as shown by increased response to stimuli, but to a more or less spontaneous and abnormal action of certain nerve centers and muscle groups, which gives rise to useless and meaningless movements of certain portions of the body, and produces partial or total inability to perform comparatively simple acts, such as writing, buttoning clothes, touching a point with a finger, walking, or talking. It may be manifested in the mild form of occasional twitching or jerking of one hand, or in the severer form of jerking and twitching of muscles of one half or of all the body. In mild cases it may be detected by holding the child's hand between the palms, and noting the twitching, or by observing the movements of the tongue.

It is preëminently a disease of childhood, for 34 per cent of the cases occur between five and ten years of age, and 45 per cent between the ages of ten and fifteen. It is most common in the thirteenth year for girls, who are about twice as liable to it as boys. The largest number of cases occur in the spring, and an attack usually lasts from four to ten weeks. It is frequently associated with rheumatism and heart disease; but its most frequent cause is excitement, especially fright. Bright children are more subject to it than dull ones. Worry, fright, and fatigue make it worse, and often bring on another attack after recovery.

The best remedy for it is as complete rest as possible of mind and body, with nutritious and easily digested food. If possible, the child should be kept in bed day and night for some time, even though he is at first restless. In any case he should not be allowed to continue in school, unless the home conditions are extremely irritating and unfavorable. He is likely to be made worse by the effort to keep up with his class, and his presence in school often affects unfavorably nervous and choreatic

children, especially the latter. There is no doubt that chorea may be produced in such children by force of suggestion. When there are children in the school liable to chorea, particular care should be taken to avoid excessive fatigue, excitement, fright, or worry, caused by reproofs or severe examinations.

Stuttering is sometimes very properly classified as a form of chorea, for there is in reality a spasmodic contraction or twitching of some of the muscles concerned in speech. Stammering is want of proper control of the muscles of speech so that words are not readily pronounced or the sounds given in the proper order because of inhibition of action in certain centers. If, however, a stammerer becomes embarrassed, this temporary condition of nervousness may lead to spasmodic activity of the centers and consequent stuttering which may become a habit, though there is no real chorea.

There are three principal groups of muscles concerned in speech: (1) the muscles of breathing which control the flow of air, (2) the muscles of phonation that control the vocal cords, and (3) the muscles of articulation which are concerned in molding the sounds in the mouth. Correct pronunciation requires not only that all of these muscles shall act perfectly, but that the different groups shall act harmoniously and in the right order. Stuttering and stammering are caused by lack of proper harmony as to amount, time, or order of contraction of the different groups of muscles, while ordinary defects in pronunciation are usually due to an improper use of the muscles of articulation which mold the sounds in the mouth. Stuttering and stammering, therefore, call first for training in breathing, then in phonation, and then in these processes combined with articulation, rather than training in articulation alone.

An habitual stutterer or stammerer should not continue in school, because the embarrassment of trying to recite is likely to increase the difficulty, and his presence in the school may

develop, by imitation and suggestion, a similar defect in other children who have the slightest tendency in that direction. A specialist, rather than an ordinary teacher, is needed to deal with such defects when they have become habitual. Incipient cases may, however, often be prevented from developing by the wise teacher, though perhaps not without individual work with the child when other pupils are not present. Some drill in breathing and phonation is often needed; but the principal thing is to free the child from the embarrassment of trying to say what he cannot, and to inspire him with confidence in his ability to speak. Sometimes concert drills in breathing, phonation, and articulation, alternating with the same exercise by designated individuals, will be of advantage to the whole school and at the same time completely cure the incipient stammerer or stutterer.

SUGGESTIVE OUTLINES FOR OBSERVATION

Countless outlines and directions for the study of children may be, and have been, made. Though many are so complete as to be cumbersome, none of them are exactly suited to indicate the special peculiarity of *every* child. Minute analysis of the characteristics of individuals is interesting to a certain extent, and has some value as training for the teacher, but she gains little from frequent attempts to analyze minutely the characteristics of all her pupils. Usually, she has only a few exceptional pupils who need much special study and treatment. Except in the case of a few pupils, who are all-round puzzles, the teacher generally needs to study only the causes and effects of one or two fundamental peculiarities as a means of knowing what to do for a child. The significance of any peculiarity depends not so much upon its prominence, as compared with that characteristic in other children, as upon its prominence as compared with other qualities possessed by the same individual. Even exact physical data, such as the lung capacity of a ten-year-old boy, have no

significance until you know whether the boy is large or small for his age. The teacher, therefore, needs to compare the child's characteristics with the others that he possesses, to determine their harmony and unity, rather than simply to compare them with those of his companions.

The outlines given below are not intended to be in any way complete, but merely to be suggestive of what is likely to be most significant regarding a school, recitation, or individual.

The following questions prepared for normal students about to enter the practice schools are good ones for any teacher to ask soon after taking charge of a new school.

I. OUTLINE FOR THE STUDY OF A NEW SCHOOL

1. Should there be any change in the light or ventilation of the room, or in the seats of the pupils? What portions of the blackboard are clearly visible from the different parts of the room?

2. Is the school as a whole about the average for schools of this grade in age, size, ability, and advancement?

3. Are there any pupils who are much behind or ahead in any of these respects, and if so, what explanation of such variations can you give?

4. Are there any pupils who show signs of poor health, nervousness, defects of eye and ear, and if so, what are the signs you have noticed? What can the teacher do for such pupils?

5. What do you notice in the habits and disposition of the school as a whole that is good, and what that needs improvement? What improvement do you expect to try to make?

6. Answer the same question as in 5 for individual children who have habits and dispositions different from the rest of the school.

7. What subjects are the pupils most interested in and what least?

8. The same questions as in 7 for individual pupils differing from the rest.

9. Make a special study of any child who seems to be a leader of a part or all the school, trying to determine how he leads his companions, and how he can best be led by the teacher.

The following outlines are intended to be used by normal students who are preparing to teach, but more experienced teachers may find them of some value.

II. SUGGESTIONS FOR OBSERVING INDIVIDUAL PUPILS

In getting acquainted with children it will be of advantage to note facts and form judgments in regard to the following points so far as you have opportunity to do so.

1. *Physical Characteristics.*

 Size of child for his age.
 Health.
 Evidence of, or freedom from, nervousness.
 Characteristics of attitudes and movements.
 Condition of eyes and ears.

2. *School Work.*

 Work as compared with the average of his class.
 Success in different subjects.
 Chief merits or defects as a pupil.

3. *Life outside of School.*

 Character of his home.
 Occupations outside of school in the way of studying, reading, working, or playing.
 Characteristics shown outside of school different from those in school.

4. *Mental Characteristics.*

 Ability, quickness, and accuracy in perceiving, imaging, remembering, and reasoning.
 Emotional characteristics as manifested in fear, anger, jealousy, bashfulness, pride, and interests.
 Effect of praise and blame.
 Character of *attention*, reflex or voluntary, continuous or intermittent, intense or slight.
 Actions, impulsive or deliberate.
 Persistency or lack of it in working. How best appealed to? What is needed most, stimulation, repression, or direction?
 Evidence of his tendency to lead or to follow and imitate.

III. SUGGESTIONS FOR OBSERVING A RECITATION

Is the lesson (*a*) a review and drill lesson, or (*b*) the presentation of new truths?

If (*a*), is the chief aim to fix in memory or to gain speed and accuracy in what is already known?

Does the teacher rely upon many repetitions for her results, or does she depend more upon intensity of interest?

To what extent does interest and success depend upon the rate of working, devices used, and variety introduced into the drill? Are all the children kept busy all the time during the lesson?

If (*b*), what is the aim of the lesson?

1. *Subject Matter.*

What is given the children? What can you say as to the amount and arrangement of this subject matter and its connection with preceding lessons and those that are to follow?

2. *The Teaching.*

Is the subject matter presented by means of objects, representations of objects (pictures, diagrams, models, maps), or by means of words (printed or oral), or by a combination of two or more of these?

Notice what means (questioning or other) the teacher uses to connect truths taught with each other, and to lead to general conclusions and their applications.

3. *The Class.*

Are the pupils attentive and interested?

What in subject matter or mode of representation is or is not suited to the age, knowledge, and ability of the children?

What mental powers are they using principally, perceptive, representative, or thinking?

What kinds of apperceptive knowledge are they recalling: (1) previous knowledge of the same or other subjects studied, or (2) knowledge gotten outside of school by hearsay, observation, and experience? To what extent do they relate the old knowledge to the new, with or without suggestion?

Notice if correct general conclusions are reached, and if they are applied to particular cases correctly.

What habits of the class do you notice?

4. *Individual Children.*

Report all significant individual peculiarities that you note during the recitation.

A good way of promoting child study among teachers is to call for reports regarding all pupils having a certain characteristic in a marked degree; as, quick temper, perseverance, poor sight, restlessness; or regarding those who are good in reading or spelling or arithmetic, or those remarkable for size, quickness, or lack of energy. Let each teacher describe one or two of her pupils who have in a marked degree the characteristic selected, telling how they are in other respects, and what she finds to be the best mode of dealing with them. Such comparison and discussion of similar experiences will be very helpful and lead to further observations.

REPORTS AND RECORDS

There has unquestionably been much vexation of spirit and waste of time in making child-study reports, as well as in the reports required by the old-time marking system. Such reports, therefore, should be as brief and from the standpoint of the teacher as significant as possible. One like the following may be made two or three times a year with profit to all concerned.

Name of pupil —— Grade —— Sex —— Date of Birth ——
Particularly good or poor in what subjects, if any.
Character of conduct.
Remarks regarding characteristics important to recognize in dealing with the child (as sensitiveness, stubbornness, slowness, lack of persistence, special interests, special physical or home conditions, etc.).
Evidence of a change for better or worse in work or conduct.
Date —— Teacher ——

Such reports as these are of temporary value, but are not of great significance for permanent preservation. Children are so variable in their conduct, and show forth such different characteristics to different persons, that such reports may be more misleading than enlightening to subsequent teachers. The best pupil under one teacher may be the worst under another, and

the child least interesting to his teacher at the beginning of the year may be the most attractive at the close.

The same actions may also be interpreted by one teacher as shyness and by another as stubbornness, or as sensitiveness by one and as lack of feeling by another. For these reasons it is often better for a teacher to get acquainted with her pupils before she reads the reports another teacher has made regarding them.

With data obtained by tests, and from inquiry regarding the home life and past educational history of the child, the case is different. Such facts, if not more reliable, are at least more permanently significant. The number of such facts that *may be* of value is almost infinite, but the number that it will be found practicable to obtain and keep on record is very limited in most schools, where so many other things demand the immediate attention of teachers and superintendent. The admission *card* should state at least these facts: date of birth, residence, nationality of parents, occupation of father, and school attendance and promotions. Some records of objective tests and measurements of physical growth, mental ability, and pedagogical attainments may be made and kept with profit. The most important of these are tests of sight and hearing and of physical condition. If it is not practicable to have all the children tested, teachers should themselves closely observe all signs of defects in hearing and sight, and test pupils who show any signs whatever of such defects.

Defects of hearing are to be found in every schoolroom. Any pupil who is habitually inattentive or apparently careless, or who watches a teacher's mouth very closely when speaking, or who looks to see what other pupils are doing before beginning to follow directions, should be observed, and, if necessary, tested, to discover whether his hearing is defective. The teacher should notice if it makes any difference whether she stands close

in front of, behind, or on the right or left of the child when she speaks to him, and whether he shows that he hears when there is no possible chance for him to guess what is said.

The detection of poor hearing is difficult for (1) the defect may be in one ear only; (2) may be greater at some times than at others, especially when the child has a cold; (3) if the attention is first secured, hearing is often surprisingly improved; (4) nearly all children with poor hearing have learned to make shrewd guesses at what is being said; (5) few buildings are sufficiently quiet for accurate tests to be made.

In all doubtful cases, at least, the teacher should test the children with the watch or other convenient means. Several persons should be tested with the watch to find out how far it can be heard by normal ears, for watches vary greatly in loudness. The child should look straight ahead and hold a card against his face so as to conceal from his view the movements of the one testing him. Often a child thinks he hears a watch when he does not, hence it may be necessary to occasionally cover it tightly with the hands in such a way as to muffle the sound, in order to determine positively whether or not the child hears. If the distance in a quiet room at which a child can hear a watch is less than three feet, his hearing is almost surely defective, and it may be if the distance is greater.

When a child is known to have poor hearing nothing should be said about it, but he should be placed in as favorable a position as possible for hearing what the teacher and also his classmates say, and the teacher should take special pains to see that he does hear all directions that he is expected to follow. Children with defective hearing frequently form habits of inattention, and sometimes, when they are aware of their deficiency, try to excuse themselves for failure to do things they have been told to do, on the ground that they did not understand. The teacher should take the greatest pains to make this excuse an impossible

one, and to break up habits of inattention. Under no circumstances should the teacher assume that the child heard, or could have heard if he had tried, and blame him for not so doing; but she should have tested him thoroughly so that she *knows*, both from the conditions and from his expression of face or oral acknowledgment that he has heard, and then she should hold him responsible for remembering and doing what he is told. To manage a child with poor hearing without either doing him an injustice, or "babying" and unwisely excusing him for non-performance or imperfect performance of tasks, often requires great tact and wisdom.

Defects of the *eye* are more common, but somewhat less subject to serious misunderstanding than those of the ear. Pupils who hold books in unusual positions, who wink or rub their eyes a good deal, who frequently fail to do perfectly work placed on the board, or whose eyes look red, weak, or tired, or who have frequent headaches, or who wrinkle the brows, or show other signs of nervousness, should be tested.

One of the best cards for testing, and the only kind that can be successfully used with first-grade children, is one in which it is not necessary to name the letters, but merely to tell which way a series of E's of different sizes points. In order that there may be no misunderstanding, it will be well, with small children, to first test them close enough to the card to be sure that they know which way the letters point, and how to indicate the direction of the letters by pointing or by words. The child should then be placed with his back to a window, holding a stiff card over (not against) one eye, and asked to tell which way the letters, indicated with a pencil, point. The distance should be that for the smallest or next to the smallest letters on the card, and, of course, the largest letters should be pointed to first. In pointing it is well to hold the pencil vertically under the letter, that the letter may not be partly covered, or shadowed, by the

pencil, and that there may be no doubt as to which one is meant. The record of the test is made by taking the distance at which the card is held as the numerator, and the number of the last line of letters read as the denominator of the fraction. Thus, if the distance is 5 metres, and the number of the line last read is 10, the record will be $\frac{5}{10}$. This means that the child can read at 5 meters what a normal child can read at 10 meters.

The above test will usually, though not always, be sufficient to detect serious defects of vision, but in doubtful cases should be supplemented by tests for near vision and for astigmatism. As soon as a teacher is fully convinced that a pupil's eyes are seriously defective, she should advise the parents to have them examined by a specialist. In the meantime, she should place the child where he will have the best conditions possible for seeing.

The following form of card prepared by Professor Bird T. Baldwin may be used both for records of physical measurements and as standards of comparison. The most significant figures on the card are the ratio of breathing power to weight. Children who rank low in this coefficient for their age are usually either lacking in physical vigor or are backward in physical and mental development. On the other hand, those who rank high for their age are usually vigorous physically and more mature both physically and mentally than the average. All pupils showing great deviations from the norm should receive careful study and, if necessary, special treatment.

TESTS AND STANDARDS IN THE STUDY OF CHILDREN

Psychologists and child-study specialists have been busy during the last few years devising and perfecting tests and establishing standards that may be useful in studying children. Some of these are now available, but changes are being rapidly made and it will be a long while before the best tests can be selected, standardized, and substituted for the teacher's observa-

MEASURING SCALE FOR PHYSICAL DEVELOPMENT (GIRLS)

English System

Form I

Name . . . . Schools . . . .
Date of birth . . . . Nationality . . . . Examiners . . . .

Date of examination	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
School year	Kg.	1		2		3		4		5		6	
Age	5^2	6	6^2	7	7^2	8	8^2	9	9^2	10	10^2	11	11^2
Norm in inches	42.9	45.2	46.3	47.2	48.3	49.4	50.4	51.1	52.0	53.3	54.0	55.2	56.9
Height													
Weight-height coefficient	.93	.92	9.5	1.02	1.04	1.11	1.13	1.13	1.18	1.22	1.33	1.36	1.49
Norm in pounds	40.1	41.7	44.2	48.1	50.4	54.7	57.1	57.5	61.5	64.8	71.7	74.7	82.8
Weight													
Norm in cubic inches	40.0	60.0	63.0	71.3	77.9	81.8	83.5	87.3	191.7	100.9	106.7	114.0	119.0
Breathing capacity													
Vital-height coefficient	.93	1.33		1.51	1.61	1.65	1.66	1.71	1.76	1.89	1.98	2.07	2.09
Date of examination	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
School year	7		8		9		10		11		12		
Age	12	12^2	13	13^2	14	14^2	15	15^2	16	16^2	17	17^2	
Norm in inches	57.7	59.3	59.5	60.5	61.3	62.5	62.6	63.3	63.5	63.7	63.4	63.9	
Height													
Weight-height coefficient	1.51	1.55	1.62	1.69	1.73	1.76	1.84	1.83	1.84	1.85	1.86	1.87	
Norm in pounds	87.1	91.8	96.4	102.3	105.8	110.3	115.3	115.6	116.9	117.9	119.0	119.0	
Weight													
Norm in cubic inches	128.0	141.3	146.2	147.7	153.5	158.8	164.5	172.6	176.5	178.8	183.0	185.0	
Breathing capacity													
Vital-height coefficient	2.22	2.38	2.46	2.44	2.50	2.54	2.63	2.73	2.78	2.81	2.89	2.90	

These norms represent well-developed children with school-medical inspection and physical training. A small child for a given age may be well developed if the *coefficients*, height, weight, and breathing capacity relationships, are normal and approximate those indicated. The formula is

Weight ÷ height = weight-height coefficient.

Breathing capacity ÷ height = vital-height coefficient.

For example. For 5^2 years, 41 lbs. ÷ 43 in. = .95 weight-height coefficient.

In the metric system use height in centimeters, weight in kilograms, and breathing capacity in liters. The English weight-height coefficient norms × .179 = metric weight-height coefficient norms. The English vital-height coefficient norms × .00645 = metric vital-height coefficient norms.

School year	1	2	3	4	5	6	7	8	9	10	11	12	School year	1	2	3	4	5	6	7	8	9	10	11	12	School year	1	2	3	4	5	6	7	8	9	10	11	12
Health													Vision													Hearing												
Vaccination													Glands													Posture												

Note: G = Good M = Medium P = Poor C = Corrected.

MEASURING SCALE FOR PHYSICAL DEVELOPMENT (BOYS)

English System

Form I

Name . . . . Schools . . . .
Date of birth . . . . Nationality . . . . Examiners . . . .

Date of examination	......	....	....	....	....	....	....	....	....	....	....	....	....
School year	Kg.	1		2		3		4		5		6	
Age	5^2	6	6^2	7	7^2	8	8^2	9	9^2	10	10^2	11	11^2
Norm in inches . . . . . . Height	43.0	45.4	46.6	47.9	48.3	49.5	50.1	51.4	52.2	53.6	54.8	55.3	56.7
Weight-height coefficient . .	.95	.95	.96	.98	1.07	1.09	1.12	1.17	1.19	1.23	1.30	1.33	1.33
Norm in pounds . . . . . Weight	41.0	42.9	44.8	46.9	51.7	54.2	55.9	60.4	62.1	66.9	71.4	73.2	75.5
Norm in cubic inches . . . . Breathing capacity	50.0	65.6	70.0	77.2	82.4	85.6	92.6	95.7	105.9	111.5	123.2	121.6	126.2
Vital-height coefficient . . .	1.160	1.44	1.50	1.61	11.7	1.73	1.85	1.86	2.03	2.05	2.25	2.21	2.22

Date of examination	....	....	....	....	....	....	....	....	....	....	....	....	....
School year	7		8		9		10		11		12		
Age	12	12^2	13	13^2	14	14^2	15	15^2	16	16^2	17	17^2	
Norm in inches . . . . . . Height	57.1	57.8	58.2	59.5	61.0	62.2	63.7	65.1	66.3	67.4	67.5	67.5	
Weight-height coefficient . .	1.42	1.46	1.52	1.51	1.55	1.59	1.63	1.78	1.79	1.88	1.90	1.88	
Norm in pounds . . . . . Weight	81.0	84.6	89.5	90.0	94.9	98.9	104.9	115.9	118.9	127.1	128.5	127.0	
Norm in cubic inches . . . . Breathing capacity	134.0	140.5	150.8	152.9	162.5	173.8	191.7	210.0	212.6	222.6	236.4	238.0	
Vital-height coefficient . . .	2.35	2.52	2.59	2.57	2.66	2.79	3.00	3.23	3.21	3.30	3.50	3.53	

These norms represent well-developed children with school-medical inspection and physical training. A small child for a given age may be well developed if the coefficients, height, weight, and breathing capacity relationships, are normal and approximate those indicated. The formula is

Weight ÷ height = weight-height coefficient.

Breathing capacity ÷ height = vital-height coefficient.

For example. For 5^2 years, 41 lbs. ÷ 43 in. = .95 = weight-height coefficient.

In the metric system use height in centimeters, weight in kilograms, and breathing capacity in liters. The English weight-height coefficient norms × .179 = metric weight-height coefficient norms. The English vital-height coefficient norms × .00645 = metric vital-height coefficient norms.

School year	1	2	3	4	5	6	7	8	9	10	11	12		1	2	3	4	5	6	7	8	9	10	11	12		1	2	3	4	5	6	7	8	9	10	11	12
Health . .													Vision . .													Hearing . .												
Vaccination													Glands . .													Posture . .												

Note: G = Good M = Medium P = Poor C = Corrected.

tion and individual judgment. Indeed, it is only in certain lines that tests may take the place of observation, and in many cases even in these lines the observations of the teacher made while the test is being taken, will furnish valuable supplementary data.

Standard tests of physical growth and ability, such as measurement of height, grip, lung capacity, etc., vary only slightly with the personality of the one who makes them. More care is required in securing the conditions necessary to accurate measurements and calling forth the best efforts of children in the strength tests.

In testing for sense and motor defects still more care is needed in getting accurate results, since children are readily affected by suggestions of the observer and are much inclined to use other senses than the one being tested. They also guess or infer on the basis of the situation presented and truths already known. These factors are of considerable importance, especially in testing hearing by means of a watch or the voice. Slight movements of the observer or changes in his tone of voice are responded to rather than the sounds being used as tests.

In the more distinctly mental tests not only must care similar to that exercised in testing for sense defects be exercised, but the mental status of a child may be determined as readily by an experienced observer who watches *how* the child works as by the unskilled observer who merely records the objective results achieved by him. This applies especially to tests of mental intelligence. In so far as success and speed are dependent upon the use of certain methods of working rather than upon the rapidity of movement and thought, as in the form board and other tests, they indicate whether the subjects have sufficient intelligence to proceed in an efficient way. The test gives the experienced observer a chance to note the significant thing, how the subject works; but this is something not easily made a matter of accurate and understandable record. The best tests

will be those that involve intelligent methods as a necessary means to success, regardless of the time required, or that provide a definite means of recording the manner of working. To do this becomes more and more difficult as higher mental processes are tested. For example, it is hard to objectively determine the correctness and maturity of concepts as indicated by definitions, although an expert can readily see that a given definition indicates more or less maturity of mind.

The most valuable tests of maturity of intelligence thus far are the Binet tests and modifications of those tests, and they have proved most useful in selecting feeble-minded and backward children. Progress is being rapidly made in rendering tests more independent of the observations, knowledge, and judgment of the observer and also in developing those measuring the higher powers of an individual and indicating his personal characteristics; yet observation and personal judgment must for many years, and perhaps always, retain a large measure of usefulness. These judgments are greatly improved by being made in connection with familiar and definitely conditioned tests; hence the tests are valuable for observational purposes even when the objective results alone cannot be depended upon.

It must be recognized also that scientific tests are suited to measuring quantity rather than quality; hence in studying human beings personal observation and judgment must always be used in dealing with them. An experienced observer in any line may more *quickly* "size up" an individual and interpret a situation than can a scientist by means of tests; hence it will always be of advantage for teachers to be good observers of children, however perfect the means of testing them may become.

Tests of children to determine special talent and vocational ability are being developed and will probably prove to be of value, especially in some lines. They will always, however, be subject to important limitations. One is that success depends

not simply upon special ability of one kind, but upon general ability and several varieties of special ability as well as upon energy and perseverance and upon social qualities. Different species of animals survive by different means, and in a similar way individual men succeed in the same occupation by different qualifications and methods. The probabilities of success or failure indicated by the tests of supposedly necessary powers may be more than counterbalanced by strength or weakness in other lines. Only a beginning has been made in this field, but the studies of Wooley indicate that general ability is more significant for vocational direction than special talent.

One of the most promising uses of tests is in objective determination of the results of teaching. The effects of the teaching upon the personality of the individual can probably never be measured in any completeness by objective tests, but the ability to make use of one's teaching in certain ways may be. The ordinary method of estimating these results by examinations and by the judgment of teachers is notoriously unreliable. By the help of psychologists, educators will in the future be able to use standard tests with considerable accuracy in determining the results of teaching. When these tests have been fully developed, simplified, and standardized, it will probably not be more difficult for teachers to use them than it has been to use the old marking and examination system. The results of such tests have a definite meaning by whomsoever given, while under the present system, 95 per cent from one teacher may mean no more than does 75 per cent from another. The tests that are of most use so far, are in handwriting, arithmetic, spelling, and reading.

Not only are standard tests useful, but norms or standards of achievement are necessary in interpreting the results of tests given to an individual or a school. These norms, however, should be regarded as means of facilitating comparisons and as aids in forming judgments, and rarely should they be set up as

ideals or standards to which individuals must *conform*. Children should not be treated as regards their mental qualities as Procrustes treated his victims in their physical persons. We do not try to make an individual tall or short, and no more should we insist upon his reaching the average standard in handwriting, arithmetical calculation, etc., regardless of whether the efforts being put forth are bringing sufficient results to justify continuing that rather than some other form of training.

If tests are sufficiently simplified, a teacher by using them may quickly discover a pupil's place in the educational field and can put him with pupils of like attainments for further training. At intervals he may be tested, and on the basis of his progress in various lines his further training may be decided. It is generally best to have him approach the norms of other pupils if he can be brought to do so without expending too much time and energy, but the possibilities of useful development which he possesses in the greatest degree should be sought, in order that he may be given opportunity to gain most by working in the line of his endowments rather than in the field of his greatest deficiencies.

The tests and standards now being developed will be of immeasurable value not only in developing a science of education and as an aid to practical administrators, but to the individual teacher. They will give her much more exact data than can be obtained by mere observation, and they will afford her a good opportunity for making valuable observations, yet scientific tests can never take the place of sympathetic observation of *personal* characteristics and of quick perception of the moods of pupils, in deciding how to deal with them at the moment. The successful teacher of the future will learn to use the tests prescribed by specialists as an *aid* to more accurate judgment of conditions and more intelligent plans for dealing with children, and not as substitutes for her own intelligence and tact.

Suggestions for Reading

The books of most general value on the subject of studying children in school are those of Warner, Rowe, Hastings, and Groszmann, and the reports of Christopher and Smedley to the Chicago Board of Education, while various educational journals and reports of child-study societies, especially of Illinois and Minnesota, contain numerous outlines and suggestions, and also some reports of school superintendents such as Spaulding of Passaic, N. J.

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